The Engineering and Mining Journal

WITH WHICH IS CONSOLIDATED "MINING AND METALLURGY."

VOL. LXXVIII. NEW YORK, THURSDAY, NOVEMBER 17, 1904. No. 20.

THE ENGINEERING AND MINING JOURNAL. ESTABLISHED 1866

PUBLISHED EVERY THURSDAY

261 BROADWAY, NEW YORK.

TELEPHONE 6865 CORTLAND P. O. BOX 1833.
CABLE ADDRESS "ENGMINJOUR" NEW YORK.

T. A. RICKARD . . . . . EDITOR

FREDERICK HOBART, CHARLES S. PALMER, D. H. NEWLAND . . . ASSOCIATE EDITORS

SPECIAL CONTRIBUTORS.

NEW YORK . . . . . R. W. RAYMOND, J. PARKE CHANNING, JOHN A. CHURCH, ROBERT T. HILL, JOSEPH STRUTHERS
BOSTON . . . . . W. R. INGALLS, EDWARD D. PETERS
PHILADELPHIA . . . . F. LYNWOOD GARRISON, R. A. F. PENROSE, JR.
ANSTED, W. VA . . . . . W. N. PAGE
WILKES-BARRE, PA. . . . . ROBERT V. NORRIS
WASHINGTON . . . . . S. F. EMMONS, EDWARD W. PARKER, J. E. SPURR, W. H. WEED
DENVER . . . . . PHILIP ARGALL, CHESTER W. PURINGTON
SAN FRANCISCO . . . . . R. GILMAN BROWN, CHARLES G. YALE
LONDON . . . . . A. G. CHARLETON, HENRY P. COLLINS, J. H. CURLE, T. KIRKE ROSE
SOUTH AFRICA . . . . . T. LANE CARTER, G. A. DENNY
AUSTRALIA . . . . . DONALD CLARK, F. DANVERS POWER

HORACE M. SWETLAND . . . . . PRESIDENT
J. T. MORRIS . . . MANAGER AND TREASURER

BRANCH OFFICES.

CHICAGO, Tel.: Harrison 3326 . 520 Monadnock Block
PITTSBURG, Tel.: 504 Court . 701 Keystone Building
DENVER . . . . . 206 Boston Building
SALT LAKE CITY . . . . . 662 Main Street
BUTTE, MONTANA . . . . . 19 & 20 Owsley Block
SAN FRANCISCO . . . . . 168 Crocker Building
LONDON, ENGLAND . . . 20 Bucklersbury, E. C.

SUBSCRIPTION, payable in advance, $5.00 a Year of 52 numbers, INCLUDING POSTAGE in the UNITED STATES, CANADA, MEXICO, CUBA, PORTO RICO, HAWAII or the PHILIPPINES.
TO FOREIGN COUNTRIES, INCLUDING POSTAGE $8.00 or its equivalent, 33 Shillings; 32 Marks; or 40 Francs.

NOTICE TO DISCONTINUE
Should be WRITTEN to the New York Office in every instance.

Copies are on sale at the news-stands of the following hotels:—Waldorf-Astoria, New York; Brown Palace, Denver; Palace Hotel, San Francisco, and the leading hotels in the principal cities.

ADVERTISING COPY
Should reach NEW YORK office by MONDAY morning of issue week; CHANGES OF COPY by the PRECEDING THURSDAY.

Copyright, 1904, by
THE ENGINEERING AND MINING JOURNAL.

Entered at New York Post Office as 2nd Class matter.

CONTENTS.

Editorials:
Notes 777
Mining in Colorado. 778
Underpaid Geologists. 779
Selling Pig Iron by Warrant. 779
Market Conditions 780
Metallics 780
Discussion:
The Discovery of the Calumet & Hecla, *James D. Hague* 781
Experts . . . . . *J. H. Collins* 782
*Ventilating a Tunnel . . . . . *Louis D. Tracy* 782
Experts and Experts . . . . . *G. E. C.* 782
Development of the Mining Engineer, *Robert H. Richards* 783
Egyptian Gold Mining. 784
*Copper Mines of Lake Superior, VI. *T. A. Rickard* 785
The Iodimetric Determination of Copper, *Andrew M. Fairlie* 787
Notes from Pinal County, Arizona, *Special Correspondence* 788
*Copper Ores in the Cascade Mountains, *R. H. Stretch* 789
*The Operation of a Tube Mill. . . *Hermann Fischer* 791
Sault Ste. Marie Canal Traffic 793
Mine Inspectors in Pennsylvania. 793
The Production of Finished Iron and Steel. 794
Working Titaniferous Ores in India. 795
Some Illinois Coal Statistics. 795
*Coal Mining in Asturias, Spain . . . . . *Henry Louis* 796
Books Reviewed. 796
Books Received 797
Correspondence:
Coal Mine Accidents . . . . . *Observer* 797
The Passing of the Forge . . . . . *Iron-Master* 797
Abstracts of Official Reports:
El Oro Mining & Railway Company, Ltd. 798
Questions and Answers 798
Recent Decisions 799
Patents Relating to Mining and Metallurgy:
*United States 799

*Illustrated.

DEPARTMENTS.

Assessments 814
Chemicals and Minerals:
New York 811
Foreign 812
Wholesale Prices-Current 816
Coal Markets:
United States 808
Foreign 809
Financial Notes:
Gold and Silver Movement. 812
Prices of Foreign Coins. 812
Industrial Notes. 805
Iron and Steel Markets:
United States 809
Foreign. 810
Metal Markets:
Silver 812
Copper, Tin, Lead, Spelter, and Minor Metals. . . . 813
Mining News:
Summaries—Bisbee, Butte, Dawson, Deadwood, Denver, Houghton, Salt Lake City, San Francisco, Spokane, London, Monterey, Toronto, Victoria 801
United States 806
Foreign 807
Mining Stocks:
Market Reviews 808
Quotations 814, 815
Obituary 804
Schools, Technical 804
Societies. 804
Trade Catalogues 805

EDITORIAL.

WHILE ONE OF the chief objects of the recently formed combination of European rail mills is to meet American competition, it is not impossible that attempts may be made to place foreign rails in this country. If the price of standard rails here is maintained at $28 per ton at mill—and it seems probable that it will be—British and German rails can be delivered at Pacific Coast ports, and even at Gulf ports, at a price which will be attractive to buyers. This can be done without cutting the quotations which now prevail among makers in those countries; and it looks as if some competition of this kind may be expected.

IT IS WITH particular pleasure that we publish in this issue a contribution by Mr. James D. Hague describing the early discovery of the Calumet & Hecla lode. Such carefully written testimony, by a geologist and mining engineer of the highest standing, who was an eye-witness of the first development of a mining enterprise of world-wide celebrity, will be appreciated by every reader of this JOURNAL. In the series of articles describing the splendid mining industry of the Upper Peninsula of Michigan we have endeavored to give a good deal of information which, as it deals with past events, must necessarily be subject to error. To guard against mistakes, many of the best informed of the older generation of Michigan copper men have been consulted, and the most has been made of the scanty records now available. We hope, however, that those of our readers who detect any errors, of fact or of inference, in the historic data, or in any part whatever of these articles, will do us the favor of communicating such correction as they see fit to make, whether for publication or otherwise. It is obvious that to elicit such a contribution as Mr. Hague's is the highest compliment which can be paid to the writer of the articles on the Lake Superior region.

ALTHOUGH OZONE is a substance which is present in the air, in relatively minute quantity, yet it is possible that its future in metallurgy, both dry and wet, may be greater than would be commonly believed at present. It is interesting to note the many methods for generating ozone, among which may be mentioned the use of heat, the use of chemicals

(barium dioxide, potassium permanganate, etc.), the action of gradual oxidation, the action of electrolysis, the influence of the silent electric discharge, and even the action of the newer radio-active substances. The chief application of ozone thus far has been in the direction of sterilization of air, water, foods, etc., in the oxidation and reduction of coloring substances, perfumes, and the like; but, if the eventual result should be the production of cheap ozone, who can tell what it may not do for metallurgy? The necessity of noting the influence of the humidity in the atmosphere has been well shown by Mr. James Gayley's notable experiments on dry-air blast. It certainly will be interesting to observe what the experimenter and the practitioner will do with ozone in metallurgy.

THE EXPERIMENT at co-operation in slate quarrying in north Wales, the oldest and largest producer in the world, is attracting attention, as the motive suggests retaliation against Lord Penrhyn and his friends, who, during the prolonged strike three years ago, discharged many union laborers. In the New Co-operative Quarries Pioneer Society, which will lease and work only Crown lands, the leaders hope to found a haven for the "emancipation of labor from the bondage of capital." To override any opposition, trade-unionists throughout Great Britain are asked to subscribe funds sufficient to guarantee the success of the co-operative enterprise. Already considerable money has been raised, and, notwithstanding the unprofitable working of one quarry, explained by heavy expense in developing, the promoters are hopeful.

It would be interesting to learn what protection has been assured stockholders in the Co-operative Quarries Society should a labor agitator stir up the quarrymen, whose pay may be necessarily under the average? And then, will the members of the trade-unions continue to pay toll during a long period of competition such as was experienced when America and other foreign countries entered British territory?

OUR ESTEEMED contemporary *The Sun* has a funny column entitled 'Mining News'; this appears every Monday. The last issue, in referring to the tin ore of the York peninsula, in Alaska, states:

"This ore will average from 40 to 60 per cent, and is far superior to the product of the mines in Wales. It is demonstrated beyond any doubt that the veins are true and the ore is there in quantities to last for years. It will require a large smelting plant to reduce this tin, and it will be necessary to establish it on Puget sound, where coking coal can be obtained easily."

It would be difficult to convey more misinformation in as many words. The ore does not *average* anything of the kind, and there are no tin mines in Wales. Tin—from Bolivia and elsewhere—is smelted at Swansea, in Wales. Tin ores usually average 1 to 3 per cent metallic tin in the form of the mineral cassiterite or 'tinstone,' the di-oxide of tin, carrying 78 per cent metallic tin. The veins are no more "true" than the statements concerning them; the theory underlying the term 'true fissure vein' is as extinct as the pterodactyl. Statements of "ore to last for years to come" in prospect holes, were made in the days of Rameses—with similar lack of proper evidence. Tin ore is not smelted, as mined, but undergoes milling or dressing, the crude ore, with its small proportion of metal, being concentrated to a product containing 60 to 65 per cent tin. It is this concentrate that is shipped to the smelter. Coking coal is easier to get—even on the West coast—than tin in paying quantity. In our next issue we shall publish a comprehensive article on 'Tin in the United States.' In the meantime we regret that a great metropolitan newspaper should publish 'mining news' which repeats the stupid blunders of the village press.

ON ANOTHER page of this issue we publish a paper by Mr. Fairlie on 'The Iodimetric Determination of Copper.' At a period in the history of metallurgy when quickness in knowing the actual tenor of slag, tailing and slime is daily emphasized, this method is to be commended, not only to the attention of all chemists, but also to the consideration of superintendents, who have fallen into the habit of waiting for the results of the electrolytic method. Nearly all who have given a fair trial to any of the recent modifications of the iodide method for copper can testify to an efficiency comparable even with that of the electrolytic method. Indeed, it has always been to us a matter of wonder that so much faith should be placed in the electrolytic method on the large scale, when we consider the excessive sensitiveness of the metallic copper film to oxidation and hydration. The electrolytic method requires many hours—usually over night—to furnish its results; the iodide method, even on the large scale, will practically check the figures of the electrolytic method, and far outstrips it in time, as it requires only two or three hours, or less. In improvements of this sort, comment is unnecessary, but it is desired to bring the matter directly before the attention of all chemists, metallurgists and superintendents generally.

THE ARREST OF progress in the Simplon tunnel by reason of the hot springs tapped by the northern heading will remind the mining engineer of similar obstacles encountered, for instance, in the deep workings of the Comstock. The Simplon thermal spring yielded 80 liters per second or 1,260 gallons per minute of water having a temperature of 46° C. or 115° F. In order to reduce the velocity of inflow, the orifice of the spring was enlarged, and in order to cool the water issuing from it a flow of cold water obtained from another spring intersected by the tunnel workings was pumped into the outlet of the hot spring. The drain through which the warm water makes its exit is confined closely by heavy boards in order to prevent the escape of heat into the air of the tunnel. In conveying the cold water for spraying at the face, or to mix with the hot, it has been found that the best non-conductive protection is a packing of broken charcoal in an outer casing of sheet iron. The great volume of water needed for refrigeration and for power has required so much piping as to impede the work of excavation. On the other hand, the system of twin tunnels, of a similar length and depth, has been fully vindicated, despite the slight drawbacks due to the fracturing of the rock between them and the necessity for the subsequent repair of such portions of the work. The main point of interest just now is the problem of dealing with the large volume of water which will be encountered when the tunnel, advancing from the south, breaks into the northern heading, where it is estimated that there are 1,800 tons of water, behind which there is a flow of over 1,600 gallons per minute of hot water. At the critical moment it will be necessary also to pump cold water into the headings from both ends in order to combat the heat, so that the engineers are properly anxious regarding the outcome. The skill which they have shown thus far will, however, we believe, enable them to meet these and other difficulties as they arise.

MINING IN COLORADO.

Among the changes consequent upon the recent State elections will be the retirement of Governor Peabody in favor of Mr. Alva Adams. However well-meaning the defeated executive of Colorado may have been, his inability to see beyond one, and that an extreme, aspect of an industrial quarrel, caused the labor disturbances in his State to approach within measurable length of even graver disorders, and it is with a feeling of relief, therefore, and strong hope for the future, that we hail the election of a man who not only has been twice already Governor—with credit to himself and to the State—but is possessed of a wide experience in the operation of mines and the humane treatment of workingmen. Now that the stress of conflict is over, the opponents of Mr. Adams will, we feel sure, cease to libel him with the charge of being in alliance with the unintelligent and un-American tyranny of the Western Federation of Miners. Whether he may have been, and is, in touch with the leaders of the respectable labor element in Colorado, we do not know, but if he were, it would be a matter for congratulation. This recurrence of strife and succession of brutal outrages, now on one side, now on the other, which has hurt Colorado so deeply during recent years, can only be ended by the joint effort of those of the mine operators who are

humane and those of the mine-workers who are reasonable. Mr. Adams, we believe, represents both. In any event we ask our Eastern contemporaries to have patience. Mr. Peabody will return to his country bank, General Sherman Bell will retire to Mexico, where his methods will be better appreciated, and Mr. Adams will be prepared to put down disorders, whether started by hot-headed operators or vicious agitators. And we shall have peace. That is all Colorado needs. It has amused us—when it has not provoked resentment—to know that our condemnation of the excesses, first of the labor agitators and later of the operators, has induced the statement that we desired the diversion of capital from the mines of Colorado to those of Mexico. If nearly twenty years of professional life among the splendid mining districts of Colorado and the personal friendships of early manhood were insufficient to maintain a kindly interest in that great State, then assuredly the unprejudiced knowledge of Colorado's mineral resources would be enough to prevent the Editor of this JOURNAL from wishing at any time to divert the investment of capital from a region that has contributed in such notable degree not only to the reputation of mining as a business, but to the technical advancement of the industry in its worldwide aspects.

UNDERPAID GEOLOGISTS.

In the Australian State of Victoria there is much discussion concerning the organization of the Mines Department in its relation to the Geological Survey. Hitherto there has been a director of the Geological Survey, subordinate to the Secretary for Mines, but the recent loss of the head of the geological department, who happened to possess an unusually intelligent grasp of mining, has led to the suggestion that a re-organization is desirable, to the end that a Director of Mining supervise the work of the two officials who have hitherto represented the scientific and clerical bureaus in the Mines Department. The present Secretary for Mines in Victoria is a competent clerk who has, by sheer staying power, won, at an advanced age, the position of administrative head of his department, while the geological chief has usually been a scientific man rather out of touch with the actualities of mining. That does not seem a promising arrangement. Our distinguished contemporary, *The Australian Mining Standard,* says that there is need of a Director of Mining "with scientific attainments and practical knowledge combined." He would supplement the geological researches of the Survey by investigations covering the economic treatment of mineral deposits. This recalls some of the discussions which have taken place before the American Mining Congress, in regard to the aid which the federal government should give the prospector and the investor engaged in the business of mining. At the Portland meeting we met a gentleman from Maine, who wished a resolution to be passed calling upon the President to appoint a bureau, the duty of which it should be "to examine and report on every mining prospect and decide whether it warranted the investment of money." The idea, it was frankly stated by the proposer—who was very far indeed from being a fool—being "to save the Eastern investor from losing his money in mining schemes."

This is an old problem, bristling with difficulties and inviting remedies worse than the ills which it is desired to cure. A purely clerical head to a mines department is obviously a mistake; a chief of the geological survey who knows nothing at all about mining is also a misplaced official; a man possessed of ample mining and metallurgical experience would be a desirable director of a mining department, but such a man, if he also possessed executive ability of the high order required for the administration of a large organization, would scarcely be available at the salary usually paid to subordinate officials of the government. The gentlemen who occupy these positions in Australia are paid less per annum than a professional man of high standing will earn in a month.

From an acquaintance with the official geologists of the Australian States and the members of our own Survey, we feel that at the root of the disorganization discernible, no less here than at the Antipodes, is the fact that the contrast between the earning capacity of a capable geologist and that of an efficient professional man in other walks of life is too marked, the result being either that the geologist ekes out a precarious living by dabbling in matters outside his ken, or he abandons his career as a geologist to obtain a better livelihood elsewhere. Such conditions tend to kill scientific enthusiasm, without creating professional spirit, and introduce a commercialism into scientific work which robs it of its highest attainment. In Victoria, as in the United States, we would like to see the work of our scientfic men better appreciated and more properly compensated, and it would be well if they in return ceased wandering after strange gods, more especially the golden calf, and gave themselves up more sincerely to the beneficent labors to which they are dedicated.

SELLING PIG IRON BY WARRANT.

For many years it has been the custom in Great Britain to store a large part of the pig iron production, especially that of the Middlesborough district and Scotland, in public warehouses, and to sell the iron by means of negotiable warrants. These warrants passed from hand to hand, and were usually good for deliveries at any of the storehouses. They served a convenient purpose in a country where deliveries did not extend over a wide range of territory, especially at a time when the grade of pig iron was not as close as it has become in recent years. Moreover, they became a handy tool of speculation, and, as many of our readers doubtless recall, fluctuations in pig iron warrants have been very great, and there have been times when actual possibilities of delivery were largely over-sold. Such speculative transactions, however, were not for actual consumption, but settlement was made by the payment of differences, as in transactions on the stock exchange.

Nearly fourteen years ago the American Pig Iron Storage Warrant Company, with George H. Hull at its head, was organized, and established storage yards in different places, its avowed purpose being the introduction of a warrant system of selling iron in this country. For various reasons, however, the system was not kindly received by our ironmasters, and although the company at different times has stored a good deal of iron in its yards, especially in the South, the transactions in warrants have never come into vogue. An attempt was made some three years ago to deal in the warrants on the New York Metal Exchange, but the limited facilities of that exchange were not favorable, and transactions amounted to very little. Another decided effort to introduce the system has now been made, and this week dealings in pig iron warrants commenced on the New York Produce Exchange, where there will be a fair chance for the development of the system. The rules adopted there, and the methods of dealing, are fully explained in our market columns.

We doubt very much, however, whether this new move will be a successful one. It will not affect, to any extent, the basic and bessemer iron, which constitute two-thirds of our production. By far the greater part of this is made by the large steel companies for their own use and does not come into the market at all; while that which is made by outside furnaces is generally sold direct to the steel companies in large lots, and those companies would not be likely, in any event, to come into the warrant market. There remains a limited quantity of forge and foundry iron which is open to dealing in this way; and we believe that the large buyers of these grades of iron would prefer to contract directly with furnaces, as they have been in the habit of doing, rather than to go into an iron market and buy a given number of warrants, however easy it may be to secure delivery upon them. Small buyers will not be attracted, but will rather be repelled by the intricacies of the exchange transactions and the necessity of paying brokers' fees. Moreover, rightly or wrongly, there is a preference among most foundrymen for special brands. This frequently depends largely upon habit and individual liking, but it nevertheless exists, and may prove a considerable factor. Experience alone can show whether these points will prove enough to limit the new method.

Another point to be considered is that the warrant system may open the way to speculation in pig iron to an extent which has not be-

fore existed. There has been at different times speculation of this kind, of course; but it has been limited to comparatively few parties, who were directly connected with the iron trade, and were able to handle large quantities. Warrant dealing on the exchange will make it possible for smaller speculators to trade in iron as they have done in stocks and grain. This may lead at times to fluctuations which are undesirable for the trade in every way. While the standing of the Produce Exchange gives a certain desirable guarantee to transactions, and while the rules appear to have been carefully framed, the introduction of a purely speculative element is more apt to unsettle quotations than to regulate them, as the advocates of the system claim.

MARKET CONDITIONS.

November 16.

The metal markets generally are very strong, and business is being done upon a large scale. In copper especially, the position is a very good one. Domestic buyers, while still inclined to be somewhat conservative, are taking very considerable quantities, and in many cases are asking for deliveries at as early a date as possible. Consumers are not well stocked as a rule, and the evidences of improving business continue to multiply, so that there is every prospect of a sustained demand. At the same time, sales for export continue very good, especially to Germany. Purchases for China in this market still continue, and it is believed that they will be in evidence for some time to come. A sharp advance in prices is recorded this week, and it is quite probable that further increases will be made before long. The large producers are generally sold up for some months ahead, and there are no surplus stocks on hand anywhere.

Tin shows some fluctuations, but little change beyond the usual uncertainties accompanying this metal. Prices are regulated chiefly by the European market.

Lead is in a peculiar position. The chief producer has declined to make any advance in the nominal price, but is practically out of the market, except for its regular large customers. Spot metal is not to be had, except at a considerable premium over the nominal price, and in fact, deliveries at any early date are not guaranteed. Under these conditions prices are uncertain and largely nominal.

Spelter is firm, and further advances are shown this week. Demand continues good, and there is every prospect of a still further advance. The foreign market is also very strong, and the latest London quotations are on a basis which would almost warrant further exports, even at the advanced price here. The Joplin ore market shows higher prices, with considerable competition for ore.

Silver has been steady, with only moderate fluctuations, and a fair demand from the East. Exports for the ten months ending with October were a little over 50 per cent in excess of last year.

The iron and steel markets are active, although a little irregular. There has been a slight lull, apparently due to the fact that sellers are not willing to make long contracts on the basis of present prices, while large buyers are afraid to rush matters, fearing too great advances. Meetings of the several steel pools are being held in New York this week, and it is believed that advances in most lines will be ordered.

The Western coal markets are in fair condition. Lake trade is approaching its close, and will apparently show a total much less than that of last year. Steam coal demand is fairly steady, and it is probable that the temporary advance caused by the short-lived strike in Illinois will be held.

The seaboard bituminous trade is in a strong position, demand being good and prices a little higher. Coastwise trade is active, as usual at this season. There is some complaint of short car supply and delays in transportation from the mines.

The anthracite market is quiet, chiefly on account of continued mild weather. The cold snaps we have had so far have been very brief—too short, in fact, to have much effect in the trade. In Chicago territory business continues rather slow, both locally and for western points generally.

METALLICS.

The word 'cab,' used by Cornish miners to describe the rock, in large or small fragments, which scales off the wall of a lode, was used originally in Cornwall in speaking either of a chalcedonic quartz or an altered granite, which lined one or both of the walls of a tin-bearing lode. In West Cornwall, 'cab' is the name of a horny gall on the hand, caused by friction.

Dikes of massive cellular, igneous rock occur in New Mexico, and also in Colorado, the cavities of which, thoroughly sealed in many cases, are filled with a fluid oil. This looks as though the oil were of volcanic origin, and argues in favor of the carbide origin of petroleum. A search should be made in rocks for carbides decomposable by water.

There is reported in the minutes of the Faraday Society (London) an interesting use of the great laterite deposits of India. These beds contain alumina in the hydrated form, resembling bauxite, though there is some contamination from silica and clay. The commercial advantages of ready accessibility, widespread occurrence at all elevations, and association with flowing water, would seem to make these laterite deposits a desirable source of aluminum. A paper giving data regarding the beds has already been published in the *Geological Magazine* by Messrs. Holland and Worth.

The Lavoisier medal of *la Société d'Encouragement pour l'Industrie nationale* has been conferred upon the distinguished electro-metallurgist, Héroult. The earlier recipients of this medal were Michel Perret, in 1885; Solvay, in 1891, and Osmond, in 1897.

In 1850 the average consumption of cement per head in the United States was 6 lb. For many years it increased very slowly, being 10 lb. in 1860, 12 lb. in 1870, and only 13 lb. in 1880. In 1890 the consumption per head had grown to 34 lb., while by 1900 it had reached 91 lb., and in 1902 it was 119 lb. per head. These figures illustrate the rapid gain of the industry in recent years.

Running a blast-furnace in connection with a converter plant of the size of the one at Anaconda, Montana, where the sole purpose is to work up refuse material and smelt over converter slag, is a much simpler operation than smelting ores, which are widely different in character and only mixed mechanically in the charge.

Cement is finding ornamental as well as practical uses. By an ingenious scheme of pouring cement into damp sand, in a method analogous to the making of cast iron, beautiful effects in sculpture are produced in concrete; reproducing garden works and the statuary of Rome and Greece in the colors, form and outline of the originals, colored in the most beautiful way and giving the most artistic effects; and at an expenditure absolutely insignificant as compared with stone.

Air-compressors to be used at high altitudes require to have the steam- and air-cylinders properly proportioned to meet the varying conditions. According to Hiscox, at an altitude of 15,000 ft., where the mean barometric pressure is 8.32, the volumetric efficiency of the compressor is reduced (from 100 at sea level) to 52 per cent; the loss of capacity is 42 per cent, and the decreased power required 23.5 per cent.

Iron heated to the point of melting expands about ⅛ in. per ft., without increase of weight. Science explains this by the theory that the heat is due to the vibrating motion of the atoms, which is greater as the temperature rises; the hotter the iron, the more room the atoms require for their movements.

Mountain cork, also called rock cork, is a spongy, elastic form of asbestos, having a texture like felt. It does not separate readily into fibers, hence is unsuitable for most of the purposes to which asbestos is applied. It derives its name from its lightness, having a sp. gr. ranging from 0.68 to 0.99.

Crocidolite is a singularly beautiful mineral, displaying delightful sheens and radiances of gold, bronze and green. It is nothing more than compressed asbestos, and is found in Greenland and Norway. It has great tensile strength, owing to the large amount of iron in its composition.

Topaz is commonly found in gneiss or granite with tourmaline, mica, beryl, etc.; also cassiterite, apatite and fluorite. The tin-mining regions of Cornwall, Saxony and Bohemia yield beautiful specimens. Many large crystals have been found in localities near Stoneham, Maine, and Trumbull, Conn. In Mexico, Colorado and Utah it sometimes occurs in clear crystals in volcanic rocks.

DISCUSSION.

Readers are invited to use this department for the discussion of questions arising in technical practice or suggested by articles appearing in the columns of THE ENGINEERING AND MINING JOURNAL.

THE DISCOVERY OF THE CALUMET & HECLA.

The Editor:

Sir—In response to your request for any interesting information concerning the discovery and early development of the great Calumet & Hecla mine, I take pleasure in offering you the following data:

The rich copper-bearing conglomerate on which the now famous Calumet & Hecla mine began its wonderful career, about forty years ago, was first found in place and disclosed to view by means of an exploring pit, which was sunk in August, 1864, by the discoverer of the Calumet lode, Edwin J. Hulbert.

This discovery was *not* due to chance. It was the result of long and careful study of the local geology and superficial appearances (showing no outcrop) of the underlying formation, with close observation of other significant phenomena, all indicating the presence of an undiscovered orebody, somewhere in the near neighborhood, beneath the unbroken, forest-covered surface, and all constantly stimulating persistent and intelligent search for the hidden wealth.

When Mr. Hulbert, in 1864, made his now celebrated discovery of the Calumet conglomerate, he had long been seeking it. As a road, land and mine surveyor during more than ten years prior thereto, he had become intimately acquainted with the region lying between Portage lake and the Cliff mine. While thus occupied he had first found, in 1853, detached pieces of copper-bearing conglomerate or breccia, and from that time was constantly seeking their original source. In 1858 he had already found the now historic block of copper-bearing conglomerate on Section 23 (56-33), near where Hecla No. 1 shaft was opened some years thereafter; and, at the same time, he had discovered the so-called 'ancient pit,' which he first opened nine years later, in 1865, and after deeper sinking, in February, 1866, made the second disclosure of the Calumet conglomerate, at the point where Calumet No. 1 shaft was opened later in the same year. In 1860 he became firmly convinced of the existence somewhere in that neighborhood of a belt of copper-bearing conglomerate, and, in that belief, he bought from the United States Government a tract of mineral land comprising 1,920 acres, which he selected and acquired for exploration and development, in the hope of finding there the object of his search. The disturbed conditions following the outbreak of the civil war in 1861, together with other hindrances, delayed the actual undertaking of this exploration until 1864, when the first exploring pit was sunk on a part of the tract he had thus purchased in 1860, and first disclosed the Calumet conglomerate on Section 13 (56-33). This development was followed, in 1865, by the digging out of the 'ancient pit' on Section 14, on land belonging to the Saint Mary's Canal Mineral Land Company, which tract was shortly after purchased by Hulbert for his then projected enterprise of the Calumet.

The discovery of the Calumet, from the first conception of its possible existence to the practical disclosure of the lode in place, was wholly due to the intelligent observation and actual exploration of Edwin J. Hulbert. The subsequent exploitation of this phenomenal occurrence of copper, and the far-reaching results which have followed its development, form one of the most interesting chapters in the history of the world's mining industry.

In November, 1863, almost a year before the actual discovery of the Calumet lode by the first exploring pit on Section 13, Mr. Hulbert had spoken of his intended exploration to me (then manager of the Albany & Boston mine), and had partially disclosed some of the reasons of his belief in the possibility of a great find, making special mention of the remarkable behavior of the magnetic needle at the locality referred to, in observing which he found indications of the presence there of a strong lode. At that time the magnetic needle was much used in that copper mining region in superficial exploration, as a means of indicating by its very notable aberrations the presence of a metallic lode beneath the surface, covered with deep soil and forest and showing no visible sign of outcropping rock or underlying formation. On the occasion referred to, Mr. Hulbert called my attention to his note-book, showing the locality he had in mind and saying that in that neighborhood he expected to disclose a great find of copper.

In this connection it is significant that the first exposure of the Calumet conglomerate was made, a few months later, beneath a covering of soil and drift, 8 ft. deep, by means of a pit which was located at a point designated by Mr. Hulbert with great precision, in exactly stated courses and distances from a given point of departure; and that the bottom of the pit reached bedrock not more than 10 ft. distant from the occurrence *in situ* of the conglomerate sought for. It is also interesting to note that the conglomerate was found to be copper-bearing at the point of discovery. Had it been found barren and discouraging it may be that no second opening would have been made. If the discovery pit had been sunk 400 ft. further to the northeast, along the trend of the formation, where Calumet No. 5 shaft was afterwards sunk, the conglomerate, if found at all, would have appeared so pinched and barren that its further development might have been wholly abandoned, and the wealth of the Calumet might be still undiscovered today.

Late in 1864, after he had sunk the first exploring pit and had disclosed the copper-bearing conglomerate on the land he had purchased in Section 13, and after he had made the first excavation of the 'ancient pit' in Section 14, on land belonging to the Saint Mary's Canal Mineral Land Company, and after he had determined the continuity of the conglomerate in Section 23 (now Hecla), then also belonging to the Mineral Land Company, Mr. Hulbert again engaged my interest in co-operation with himself in an effort to buy from the Mineral Land Company the above-mentioned tracts, which he desired to acquire for the properties now known as Calumet & Hecla; and, acting for him and jointly interested with him, I then made, under date of November 1, 1864, written application to the agent of the Saint Mary's Canal Mineral Land Company for the purchase of the east half of the southeast quarter of Section 14 (containing the 'ancient pit,' where Calumet No. 1 shaft was afterward sunk), and for the purchase of Section 23, now Hecla, and some other tracts in the same township. My application for these purchases was approved by the agent of the Mineral Land Company at $100 per acre; but the parties in Boston to whom I proposed the purchase at that price thought the venture too speculative, on the very uncertain evidences of value submitted to them, and I was thus unable to obtain the money required for the purchase. My negotiation therefore ended unsuccessfully, and Mr. Hulbert subsequently accomplished the desired purchases through other channels, at about the same price.

Section 23, a square mile, containing about 640 acres, which subsequently became the Hecla, is said to have been purchased, early in 1866, from its then owners, the Saint Mary's Canal Mineral Land Company, for the price of $60,000. I believe the east half of the southeast quarter of Section 14, about 80 acres, was also purchased, in 1865, at not exceeding $100 per acre, the price at which I had obtained my option, in 1864.

The realized value of the copper mined since then from the ground thus acquired for the Calumet & Hecla properties is an amazing record of production. I do not know precisely the gross amount; but the net profits, paid in dividends to date, exceed eighty-six millions of dollars. It is a very interesting, if not to all parties concerned a wholly pleasing reflection, that the land (referring especially to Section 14) on part of which I held, in 1864, an option of purchase at $100 per acre, and which, for lack of sufficient evidence of value, was declined by the friends in Boston to whom I offered it at that price, has since produced a realized value which may reasonably be estimated at not less than one million dollars for each and every acre included in that rejected proposal.

It was still a second year later, in November, 1865, that in company with a number of mining managers, then resident in that neighborhood, I went to inspect the find of rock, very rich in copper, then exposed in the recently excavated 'ancient pit' on Section 14; and, at Mr. Hulbert's instance, I thereupon wrote, as one or more of my companions probably did also, a descriptive letter, which Mr. Hulbert took with him to Boston, commending the newly discovered mine as an attractive and eligible venture to the consideration of certain capitalists, who then acquired and have ever since held the controlling interests therein.

As I write this, I have before me my old letter-book of that period, in which I find the press-copy of the above-mentioned written application (November 1, 1864) for the purchase of the tracts of land referred to, with an intimation in another letter that the local resident agent of the Mineral Land Company would probably recommend approval of the application for purchase and sale of the land at $60 per acre. I find also in the same book a press-copy of the above-mentioned letter, dated about one year later, referring to the 'ancient pit,' in the bottom of which the second exposure of the Calumet conglomerate was subsequently made by deeper sinking below the bottom reached by the original diggers.

It should be noted here that Mr. Hulbert has since shown that this ancient work of the prehistoric miners had no relation whatever to the copper-bearing conglomerate, over which it was sunk. He found it to be simply a *cache* for their copper, mined elsewhere; the location of the pit was entirely casual, and it was not sunk far enough originally to reach the conglomerate, of which there was no exposure until the pit had been deepened by Mr. Hulbert's men, in February, 1866.

The first copper produced for market from the Calumet lode was mined in and about

the bottom of the 'ancient pit,' early in 1866. It was hauled on sleds to the Albany & Boston, where all of it was weighed and part of it milled, the other part going on to the Franklin mill for treatment there. The rock that was milled at the Albany & Boston yielded an average of 14.5 per cent in mineral, equivalent to, say, 12 per cent or more in ingot copper.

This looks something like a case of Aztec 'salting,' and it recalls to mind the modern instance of a somewhat similar proceeding in the discovery shaft of the Little Pittsburg, at Leadville, Colo,, in which "Chicken Bill" may be said to have 'salted' a 'salt' mine, with results equally satisfactory to all concerned.

I subjoin here a copy of the above-mentioned letter, which is a record of the first reported inspection made of the earliest exposures of the Calumet conglomerate.

JAMES D. HAGUE.

New York, Oct. 20, 1904.

Albany & Boston Mine,
Hancock, Michigan,
November 21, 1865.

Mr. E. J. Hulbert,

Dear Sir:—I was much pleased and interested in an excursion which I made yesterday in company with several others to Section 13 and 14 of Township 56 and Range 33 (the Calumet location), for the purpose of examining your recent explorations on a copper-bearing conglomerate there and also of visiting the 'ancient pit,' lately discovered and opened on the same belt and in the immediate vicinity.

The developments made are not only very interesting in all that they reveal of the work of earlier inhabitants, but also furnish important additions to our knowledge of this region, indicating as they do the existence of valuable copper deposits hitherto unknown.

I think the data are not yet sufficient to enable anyone to determine which of the known conglomerate belts your newly-found one is the continuation of, but, whatever may be said of its identity, the important fact is that, so far as developed, the rock is very rich in copper.

The existence of an 'ancient pit' on one of the conglomerate belts and so remote from any of the hitherto developed veins is very interesting, whoever may have been its originators. Its appearance would not perhaps suggest so great an antiquity as is commonly ascribed to the old pits, supposed by some to have been made by the Aztecs, but it can hardly be less than one or two hundred years old. It is quite natural to suppose that the discovery on the surface of such a rich boulder as we saw yesterday, about one thousand feet from the pit, may have induced the earliest explorers of the region to conduct such a work, while the existence of so large a quantity of carbonate and oxide of copper in the pit itself would indicate a rock rich in finely-distributed copper.

Congratulating you on a discovery which bids fair to be quite important in its results, I remain, Truly yours,

(Signed) JAMES D. HAGUE.

The number of stones used in the setting of a diamond drill bit is usually eight. Their maximum weight rarely exceeds 3.5 carats, and they are used from that size down to a minimum of, say, one carat.

EXPERTS.

The Editor:

Sir—In your issue of October 20, 1904, under the heading 'Experts and Experts,' you say, "The only fit judges are the members of the profession to which the man claims to belong, and the only practical manner in which the layman can ascertain the status of the supposed engineer upon whose advice he expects to spend money, is to ask those who are informed concerning the technical requirements of the case. . . . It should be unnecessary to inform our readers that membership in any institute carries with it no diploma of reliability."

May I point out that the Institution of Mining and Metallurgy does endeavor to limit its membership to properly qualified persons, and does, to a very considerable extent give the "required assurance" of reliability.

J. H. COLLINS.

London, Nov. 2, 1904.

VENTILATING A TUNNEL.

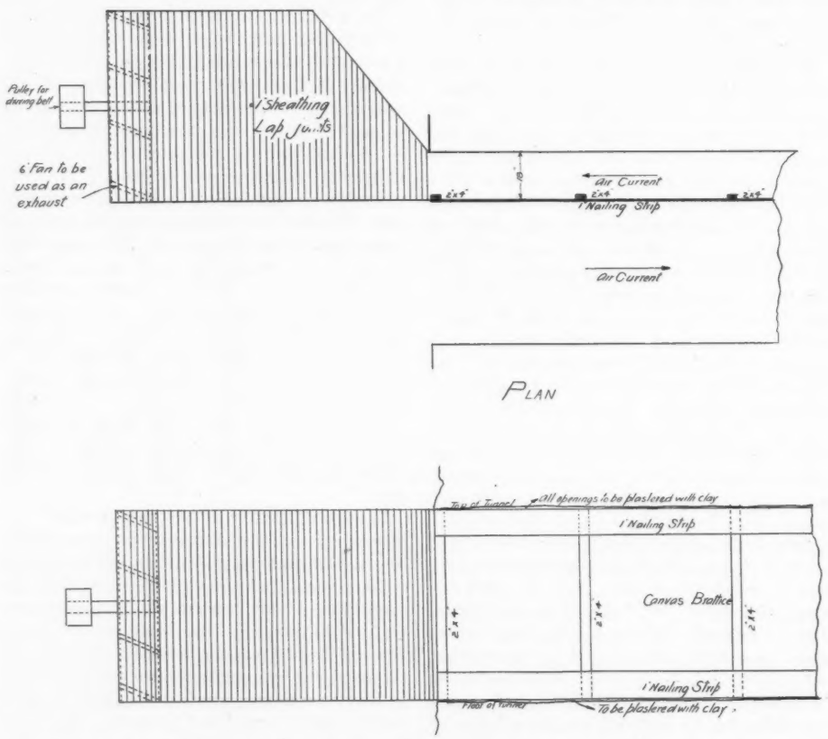
The Editor:

Sir—I have been much interested in the letter published in your number of November 3, relative to the ventilation of a tunnel in Mexico. I agree with the suggestion given in the answer regarding a furnace, but the inference obtained from the letter was that there was a scarcity of fuel, and, if such is the case, then it might be more economical to use a fan. I would make the following suggestion: A wooden fan—say 6 or 8 ft. in diameter—might be made with about eight blades from 12 to 16 in. wide; the blades to be fastened to the hub of the fan at an angle with the axis of the shaft. These blades may be made of light wood, well braced at the ends to counteract the tendency to bend back and break at the hub.

To create a draft in the tunnel, a modification of the methods used in bituminous coal mines to drive away gas from the face of headings may be used. About 18 in. from the side of the tunnel a line of posts, say, 2 by 4 in., may be set, firmly wedged against the floor and roof of the tunnel; posts to be placed 15 ft. apart; on the top and bottom pieces 6 or 8 in. wide and 1 in. thick are nailed, these to serve as nailing strips for a canvas brattice, or whatever cloth may be obtained in the vicinity, providing it be closely woven and fairly heavy. The places between the roof and nailing strip and between the floor and nailing strip may be plastered with clay.

At the mouth of the tunnel a short air passage of boards may be built to the fan, overlapping parts made air-tight with clay. The fan should be run as an exhaust, and should be geared to a speed of 75 revolutions per minute. I do not think it would be necessary to run the fan more than an hour, and this might be done between shifts, or, at the dinner hour, if they have a corresponding time in Mexico. One objection to a furnace in a hot climate is that the difference in temperature between the atmosphere and the heated current is so much less than in a northern climate that the ventilating current is sluggish.

Accompanying is a sketch of the general plan. It does not aim to give details, but simply to illustrate this method.



LOUIS D. TRACY.

Pittsburg, Nov. 7, 1904.

EXPERTS AND EXPERTS.

The Editor:

Sir—I have been greatly amused by reading the extracts from the report of an "expert," given by "Engineer" in your issue of October 20; but I think the enclosed—which has already been highly appreciated by a few of my friends—is even better.

I am afraid I must agree with you that it is not easy to formulate any practical means of protecting the public from this class of "expert." Meantime we can at least make him contribute to the gaiety of the nations.

Denver, Oct. 24, 1904. G. E. C.

Extract.

"The north end of the ——— is a bisected dike, which happened to be the richest portion of a lost zone matter, and, going down the shaft, the formation is broken, which is truly misleading, owing to the appearance of another vein having cut this formation, which is not the case; the fissure itself has separated the rock masses and faulted occasionally, caused by rotary forces acting after the ormation of the fissure, and in such cases the hanging wall slips down in several places throughout the mine, but I did not see a single degree of evidence that the vein entirely pinched out.

"If the concrete flow, or the '—— cap,' as it is locally termed, exists in this property at all—which I do not believe—it has never been encountered up to the present time, as far as I am able to determine. There are some places in the third and fourth levels where the hanging wall has slipped down; this downward movement should be carefully examined, and you will find where the footwall has been forced up spasmodically, and consequently in almost angular form, and this is why the vein never has faulted. The vein never has followed a true plane, as far as I can see, but it is in absolute evidence that the convexed and concaved conditions are found opposite each other; this is what has made the ore in the winze near the breast of the third level. The absence of any selvage there is due to decomposition; this matter afterwards crystallized, and, owing to the fact that the lateral forces cannot act under such a condition, it changed the dip and angle of your ore at this point, which may be considered a strong recommendation of the property. Unfortunately, only men of varied mining practice are able to recognize the actual condition.

"A reopening of the fissure lowered the original filling, and after it went down to a certain distance it lodged between walls that have been penetrated by a galvanic current, and the original filling, not capable of gathering values through precipitation, but resting upon and in contact with far greater values than any portion of the vein above could maintain, has caused the values to be deposited in the lower portions of the vein."

COAL IN PERU.—A British consular report from Callao, Peru, reports that there is a very large coal area in the Department of Ancashs. It is found about 66 miles from the port of Chimbote. In the Santa valley coal exists in immense quantities; in fact, it is said that it can be traced for 20 miles. Experiments made last year with Ancachs coal for steam purposes did not give satisfactory results, but it might be used for domestic purposes.

A COAL EXHIBIT.—An interesting geological exhibition has been decided upon at Liège, taking the form of samples of coal of every kind from all the mines of France. The *Echo des Mines* says that this is the first time that French coalfields have made such a demonstration, and, judging from the interest taken here in the matter, it will no doubt prove a great success. Whether specimens from French Lorraine will be on view is not stated. Apparently the borings at Eply and Lesmenils have not answered expectations, for other surveys are now announced at Vandières, Montanville, Blénod, and Pont-à-Mousson, in Lorraine.

DEVELOPMENT OF THE MINING ENGINEER.*

BY ROBERT H. RICHARDS.

Looking back through the eye of the imagination to prehistoric times, we may form a conception of an order of advance in things mining. The primitive man picked up colored stones, bored holes in them, and wore them as amulets for decorative, religious and medicinal reasons. He found the precious stones and prized them for their decorative effect. He found the gold nugget, and learned, later, that he could polish, flatten and shape it, thus making a beginning in the metal manufacturing art. Gold and precious stones at a very early date must have risen in value and begun to be property, and also begun a career as a medium of exchange. A complete mining plant, at this time, may have been an area of land with ore specimens scattered on the surface of the ground and buried in the surface soil, with a few men digging with pointed sticks and moving the soil with rude wooden shovels. The existence of ownership in the soil and mineral may have come later.

Stimulated by mineral discoveries, the miner made efforts to define, identify and name his mineral species, and so gave a beginning to the science of mineralogy, and his efforts to establish rules of occurrence of his valuable minerals did the same for geology. The primitive Asiatic, at an early date, found the effect of fire on minerals, and picked up lead, copper or iron in the ashes of his camp fires. Cornwall tin was found in the same way. The primitive metallurgist then experimented with his fires and got silver by burning up his lead, and bronze by alloying copper and tin. The possibilities fascinated him, the getting stimulated the desire to get and the ingenuity to fashion the tools to get with. There came to be a systematic use of fires for roasting ore, reverberatories for desulphurizing ore, crucibles for melting, cupels for purifying silver, hearths and shaft-furnaces for smelting. In fact, the metallurgist has done much to stimulate the development of the chemist. The miner, pushed by his metallurgical partner, soon got to the end of the loose ore lying on the surface and began breaking it from the ledges with his stone hammers. He found that by heating the rock and quenching it with water it would crumble more easily. In fact, this was probably the chief method of mining for many centuries.

A mine at this period may have been a pit or trench twenty feet deep, more or less, from which the ore and water were carried out on men's backs, using a tree with stubs of branches for a ladder. In time the metallurgist found that by manipulating his iron in connection with carbon he could harden it, and that the hardness was greatly augmented by quenching it in water. He had made the discovery of steel and of tempering it. The miner asked for a better hammer and got one of steel, and with it the point which, by blows of the hammer, chips and severs the ore from the ledge. The hammer and point, *schlegel und eisen*, must have been the standard mining tools for many centuries.

The primitive American mined copper at least 500 years before the discovery of this country by Europeans. This is indicated by counting the rings in tree trunks growing in their old workings. They mined the copper with stone hammers, heating the rock with fire to make it more friable. They mined to a depth of twenty or thirty feet, but rarely went underground; used wooden shovels to move the rock, and wooden bowls and bark troughs to dispose of the water. They did not want and could not use pieces of copper larger than a few pounds, which they took as they found them, and beat out cold into shapes, leaving the silver attached to the copper. They apparently had no knowledge of concentration or of smelting. They used the copper for tools of the household, of the chase, and of war, as well as for decorative purposes.

The making of iron tools enabled the miner to penetrate the ground. He devised ropes, buckets and rude windlasses for lifting out ore and water. His roof and walls of rock began to fall in on him, and it was necessary to bring in timber props and to leave pillars of ore to hold the walls apart. About this time the horse-windlass and a better quality of rope must have been designed for hoisting from greater depths. Mines may have reached a depth of hundreds of feet with tunnels and galleries which, though small in size, were cut out with a care and finish almost like that of the stone mason's work on public buildings. Such tunnels of three hundred years ago can be seen to-day in the German mines. The metallurgist asked for cleaner ore, free from earthy and siliceous impurities which hindered or prevented his smelting operations; to effect this, the crude stamp mill for crushing, and the sweeping buddle for concentrating ores were developed.

As to the period when the mineralogist, the geologist and the chemist occupied separate professional ground, investigating everything in their lines and contributing from their stores of knowledge to the benefit of the miner, I will not try to decide. But the time has never yet been reached when the miner could afford not to have a good working knowledge of those subjects.

The next great step was the use of drill and blasting powder (A. D. 1620). The slow, tedious chipping was replaced by the more rapid drilling and blasting out of rock masses, and the speed of mining increased immensely. Later (A. D. 1776) the steam-engine came to the help of the miner. The pumping engine came first, for removing water, and then the hoisting engine. About A. D. 1832, the locomotive was invented and used for hauling coal and ore.

We sometimes think of all engineering as depending on or pertaining to the steam-engine, whereas the true engineer is a man who uses the means at hand to accomplish his ends, whatever they may be. He can use precedent as far as it will go, and must fill in the rest from his brain. He may have to harness up a waterfall on the side of a mountain, bring down the water in a great pipe, and level gravel hills with a water jet more powerful than those used by our city fire departments. Or, he may have to use the water to compress air and convey it in pipes to his mine and use it there to drive his powerful hoisting and pumping machinery and his power drills for drilling the rock. In 1860, nitro-glycerine was introduced as a powerful blasting material, adding to the speed and economy of the work of excavation.

The miner, by his needs of prime movers, transmitting machinery, transporting machinery and use of water, has contributed much to the development of the mechanical engineer, and to a less degree to the railroad engineer and

* Abstract of a paper read at the International Congress of Arts and Sciences, St. Louis, September, 1904.

hydraulic engineer. The miner and the agriculturist really take shares in opening up a country and making civilization possible. They are both fundamental callings, taking the good things from the ground. The farmer has probably helped more in the development of the railroad, while the miner's field has given him a greater hand in developing power, machinery and hydraulics. Later, these all became independent professions, and having made great advances in their own lines they now in their turn contribute advanced ideas for the benefit of the miner.

LICONITE.—This new substitute for gutta-percha is composed of asphaltum, petroleum and gum. It is used for the insulating of electric wires (when dissolved in turpentine) and the like. It is miscible with both caoutchouc and gutta-percha. Its use effects a saving of 96 per cent, as compared with gutta-percha; but it remains to be seen whether liconite can show the endurance of gutta-percha, when subjected to such corrosion as that of sea water.

WEIGHT OF RAILS IN ENGLAND.—The present rail standard of the nine chief English railways is as follows: London & North-Western, steel rails, 90 lb. per yard, 60 ft. long; Great Western, 97½ lb.; Midland, steel, 100 lb., 36 ft.; North-Eastern, steel, 90 lb., 30 ft.; Great Central, steel, 96 lb., 36 ft., and also steel 86 lb., 30 ft.; Great Northern, 96 lb.; Great Eastern, 85 lb.; Lancashire & Yorkshire, 86 lb.; London & South-Western, 90 lb. per yard.

MINING IN BURMA.—The Great Eastern Company holds concessions in the Shan States (Burma), about 120 miles northwest of Mandalay, and within 60 miles of the Chinese border. The nearest railway station is Ta Hapalai (on the Lashio-Mandalay line), which is 33 miles from the mines. The Chinese mined and smelted a large tonnage of ore, but were driven out some 50 years ago. The Shans and Kachins have re-worked some of the old slag dumps which are found along the Steme valley. This slag is stated to contain 50 per cent lead, 20 per cent zinc, small quantities of copper and silver, and a trace of gold. The company has tested the dumps, and now proposes to smelt the old slag and prospect the ore-deposits.

IRON ORE IN BOHEMIA.—Bohemia is particularly rich in iron ore deposits. The best belt of ore is in the strata of Silurian formation running from Bischofteinitz through Pilsen, Beraun and Prague, as far as the River Elbe at Celakowitz, for a distance of over 20 miles. It attains its greatest breadth—10 miles—in the neighborhood of Pilsen, while towards the Elbe it gradually narrows down to four miles. This Silurian basin contains an almost inexhaustible quantity of iron ore. The iron ore beds between Prague and Beraun are now being worked and produce more than one-third of the total output in Austria. Beside the underlaying beds with fine-grained hematite, giving over 50 per cent of iron, two beds are being worked containing reddish-brown hematite of great purity, yielding as high as 52 per cent of iron, but more frequently red clay iron ore with a yield of from 30 to 40 per cent of iron.

EGYPTIAN GOLD MINING.*

It must be nearly five years ago since Mr. C. J. Alford was sent to Egypt by the Victoria Investment Corporation upon what he no doubt considered was a wild goose chase. The present writer happened to be in Cairo when that somewhat serious pessimist returned from a six months' trip in the desert. The serious-minded Mr. Alford told his story. He had found gold mines; whether rich or poor, he knew not; but that they were gold mines admitted of no doubt. Gorst unofficially sighed at the ridiculous waste of good money, but, as financial secretary, signed a concession. So ended the first act of the Egyptian gold mines drama. Then those long-headed Chamberlains took the matter up, and a company was formed and work begun, and as Gorst was quite willing to sign as many concessions as enterprising speculators chose to apply for, by the end of a year all Egypt, and most of the Sudan, had been cut up. There is no doubt that these speculators went blind. The whole country was an unexplored desert—waterless wastes of mountain—treeless and barren. The climate was superb, and camel riding is healthy exercise when you get over the first bump. So prospectors wandered about, backed by high-sounding syndicates, most of which had no money, and very few even the vaguest idea of where their concessions were. But none drew blanks—all came back with reports, more or less accurate, of large groups of ancient gold mines. The syndicates promptly turned themselves into companies, and in the city, at any rate, Egypt was a goldfield second only to the Rand. In the meantime the Egyptian Mines Exploration Company had been steadily working upon one of their most likely centers—Um Rus—and their results attracted the attention of John Taylor & Sons, who had, at the instigation of Sir James Carmichael, taken charge of a piece of unattractive desert. They went into Egypt seriously, and when the solemn Robert Taylor told one of his shareholders' meetings that the great Queen street firm believed in the future of Egypt, a mild flutter went through mining circles. South Africa was in the throes of war. Western Australia was suffering from the machinations of dishonest directorates. Here was a new gamble. The gamble came and went. Whether the great British public ever took a hand is uncertain. Possibly not. But that the city was keenly interested is quite sure. The city man saw a chance of getting in low down, and took it. Money went out to Egypt for development work. How far has that money gone? Has it produced any tangible results?

Let us take Um Rus. The main shaft is down 500 ft.; a 10-stamp battery with rock drills and winding plant is on the spot, and will be at work at the end of the year. The reef is 2 ft. wide, and averages an ounce over a long shoot. Allowances must be made for loss, but the net gain may be 15 dwt. This at Um Rus, with cheap labor and transport, will pay a dividend upon the £150,000 capital. Then, we have the Nile Valley, about which so much has been said, and in which there has been a good deal of share gambling. This mine was only down 157 ft. when the water came in and pumps had to be sent out. These are at work, and the mine is now unwatered. A 10-stamp mill is being put up and should be crushing early in the new year. In the meantime, a good deal of rich specimen rock has been treated, and this year over 700 oz. was won. They have a good reef at Nile Valley, and though delayed by water and various other causes, there is no reason to think the mine will not turn out well. Adjoining it is the North Nile Valley, where again rich specimens have been found and £2,750 worth won. Mr. Sleeman, the manager, reports that he has 240 tons at grass which should go 3 oz. North Nile Valley may be described as a rich prospect. Another equally rich prospect is Atallah, which is being worked by the Central Egypt Exploration Company. Here the main shaft is down about 200 ft., and they report a reef which averages 7 oz. Naturally, if there is any amount of this Atallah will be heard of again. All these three mines—Nile Valley, North Nile Valley and Atallah—are distinctly hopeful, but none of them have enough development work done to justify their being called more than extremely promising prospects. This cannot be said of the Taylor mine in the Sudan, called Om Nabardi. Here Taylors think so well of the property that they are building a railway 30 miles in length to connect with the government line, and though not down to any great depth, a good deal of work has been done, 1,500 ft. of drives being reported from January to September this year. The values vary from 5 oz. to 10 dwt., but as the pay-shoot is rich, the lower values are not important. As far as one can see, Om Nabardi is to-day (for whatever that may be worth) the best mine in Egypt.

The Egyptian Mines Exploration Company is working upon a good reef at Eridia, which goes well over an ounce, and is 2 ft. wide, but enough work has not been done to completely prove the property. The same company is also working at Fatira, where an inclined shaft is down 420 ft. on the vein—the second deepest shaft in Egypt. The values at Fatira are jumpy—possibly the expenditure of £10,000 or £20,000 would open up a big mine here—but with value so erratic it is evident that a pay-shoot has not been obtained yet. Nubia Development is prospecting its large area with eight shafts, none of which are at any depth, and lignite having been found near, they are drilling for coal. P. O. Wilson, the engineer in charge, is a very capable man, and as he thinks well of this property, it must be reckoned with. The Sudan Exploration Company is working upon a concession near Suakin, and numberless rich reefs have been found, but not enough work has been done to form any definite opinion.

To sum up. Four years' work has been done. Two mines have been opened up to a considerable extent—Um Rus and Um Nabardi. Three rich prospects have been found—Nile Valley, North Nile Valley and Atallah—the former may turn into a rich mine any week. One prospect not rich, but with possibilities, exists in Eridia; another more speculative in Fatira. The best prospecting areas in which no real mining work has been done are the Nubias, the Gold & Gem (Streeter's) and the Gabait, where rich assays have been taken. But, on the whole, Egyptian mining is distinctly honest. Taylors, Alford, Lake and Currie, Wilson, Western, Llewellyn Williams and Thomas are reliable, and not one would put his name to a report which was not absolutely correct. The development is bound to be slow, but the future seems more or less assured. The field as a whole compares more or less with the Mysore. Labor is cheap and good, and water, though scarce at first, is now too plentiful, and transport is moderate.

*Abstracted from the *Financial Times*, London, October 31, 1904.

COPPER MINES OF LAKE SUPERIOR.—VI.

By T. A. RICKARD.

At the south end of the Calumet & Hecla, the lode is worthless, except adjacent to the Hecla boundary; and to the north, on the Schoolcraft addition, a company was ruined in an effort to work that extension of the Calumet lode. Here is the place to tell the story of the Osceola. The Osceola Consolidated Mining Company was organized in 1873; it was based upon a consolidation of ground owned by J. W. Clark and Wm. Stewart, respectively; the stock was placed among a few subscribers by Horatio Bigelow and Joseph W. Clark, of Boston. E. J. Hulbert was put in charge of operations, and a mine was opened near the southern boundary of the Calumet & Hecla ground. These facts caused the company to become well advertised, so that the stock was eagerly taken on the understanding that the discoverer of the Calumet & Hecla had found "another conglomerate belt" of similar richness. The Osceola at first was supposed to be a lode different from the Calumet, its discovery being based upon some erratic boulders of conglomerate rich in copper found lying on the surface. But the boring and other exploratory work undertaken by the new company were unsuccessful, and, when it became known that the Osceola was really working the extension of the Calumet conglomerate, there was a great deal of disappointment. The mine opened on the Calumet & Hecla lode proved, however, to be fairly productive at first, but the progress of development assured ultimate failure, for the Osceola owned only a short end of the rich ore-bearing ground of its great neighbor. In this emergency, it fortunately happened that an amygdaloidal copper bed was found 800 ft. east of the conglomerate, and steps were taken forthwith to test it. This exploration was begun in 1877, and four shafts were sunk in the course of the next three years. In 1877 the production was 2,774,777 lb. copper, and it rose steadily to 6,894,256 lb. in 1892. Up to date this company has disbursed $4,439,600 in dividends, on a capital of $2,500,000.

Next we come to the story of the Tamarack, one of the best in the records of mining. In 1880 the Calumet & Hecla had gone down 2,500 ft. on the lode, and it required only 1,000 ft. more to reach the boundary between this property and the Tamarack, which adjoined to the west, that is, on the dip side. The Tamarack enterprise was the 'deep level' of the Calumet, and, while the idea of sinking a vertical shaft 2,250 ft. to intercept a lode dipping out of the ground owned by an outcrop company, is now a common form of mining enterprise at Johannesburg, it was a new and courageous plan to adopt twenty-four years ago, when Horatio Bigelow, Joseph W. Clark and John Daniell started to carry it out. Capt. John Daniell gave the reasons for the faith that was in him in words which are worthy of quotation: "The Calumet & Hecla Company divides $2,500,000 among its stockholders annually, and the very important improvement of late years would absorb a further expenditure of $500,000; for the machinery erected is of the most costly character, while it seems large enough to reach any required depth. The receipts, then, beyond running expenses, would be, say, $3,000,000. The amount of rock treated in the stamp-mills does not exceed 1,000 tons per day, say, 370,000 tons yearly. Therefore, $9.30 is the profit obtained per ton of rock.

"When it is understood that the Atlantic and the Franklin mines earn less than $1 per ton on rock treated, the Osceola less than $1.50, and the Quincy mine, in her most prosperous year, less than $4 per ton, and then on about one-third the quantity of rock, it will be seen that the effort to get a share of these unusual (in copper) profits, is prompted by very strong incentives."

THE SOUTH RANGE IN WINTER.

The Tamarack property was organized with an estate of 1,280 acres. The first shaft was started in that corner of the company's property which afforded the shortest vertical distance to the lode. The work of sinking was begun in February, 1881, and on June 20, 1885, the lode was struck. During these 4 1-2 years the lowest rate of sinking was 42 ft. per month and the highest 70 ft. The total depth was 2,270 ft.; the cost, all expenses included, amounted to $61 per foot. At 600 ft. the shaft cut the Allouez conglomerate, at 2,100 ft. the Calumet & Hecla conglomerate and at 2,700 ft. the Osceola amygdaloid. In 1885 the production of copper was 181,669 lb., and in 1886 it was 3,646,517 lb., increasing to 7,405,606 lb. in 1887 and 11,409,217 lb. in 1888. In that year, 1888, the first dividend, amounting to $640,000, was paid on a nominal capital of $1,000,000. The capital was increased to $1,250,000 during the spring of 1890 and to $1,500,000 in 1896. Up to date the dividends distributed aggregate $8,580,000.

The Wolverine, before its present era of success, had been opened up in a small way by local people, who operated one stamp, treating 100 to 150 tons per day. But the enterprise ran in debt. There was also a conflict of title, two patents having been issued to the same piece of land. Mr. John Stanton, becoming favorably impressed with the business, organized a company and pumped out the mine, but he found that it had been well gophered by tributers. He opened up new ground and started crushing in September, 1891, but soon realized that the average yield was insufficient to give profits when working on a small scale.

CHAMPION MINE IN COURSE OF EQUIPMENT.

Crushing ceased on April 1, 1892. Production having ceased, Mr. Stanton proceeded to open up the ground vigorously, and after 13 months a second start was made, in May, 1893, with one stamp treating 250 tons per day. In 1897 another stamp was leased at the Allouez mill. Since then progress has been continuous and the mine has proved increasingly profitable. From 250 tons the daily output has increased steadily to 1,000 tons per diem, and the prop-

erty has been built up gradually, the cost of more territory, new stamp-mill and equipment having been met out of earnings. The Wolverine has paid $1,770,000 in dividends on a nominal capital of $1,000,000, of which $550,000 was paid in property and $230,000 in cash.

The existing Atlantic Mining Company was formed in December, 1872, by a consolidation of a former company of the same name, owning the South Pewabic mine, with the Adams Mining Company, the joint capital being $1,000,000 in 40,000 shares of $25 each. The old mine, known as the South Pewabic, had been ruined by the leanness of the lode. After exhausting its capital stock and spending half a million beside, the company had gone into bankruptcy and the new Atlantic company was organized. This new organization benefited by the work done by its predecessor, which, failure as it was, had opened up the mine so as to demonstrate the uniformity of the lode and determine its average yield; moreover, the old Atlantic company had built a stamp-mill by the lake and had paved the way—with gold, rather than with copper—for its more businesslike successor by the accomplishment of a good deal of the essential preliminary work. The Atlantic produced 863,366 lb. copper in 1873 and 1,372,406 lb. in the year following, increasing its production steadily until, in 1888, it reached 3,974,972 lb. In 1902 the 30-year charter expired, and was renewed for a further 30-year term, the capital being increased concurrently from $1,000,000 to $2,500,000. Early in its history this mine won a reputation for cheap working, and it has long been recognized as winning a profit from the poorest copper rock exploited successfully by man. In 1902 the average yield was only 11.10 lb. refined copper per ton of ore stamped, this being equivalent to 0.555 per cent, on a total output of 4,949,366 lb. refined copper. In 1903 the yield was 12.76 lb. per ton, on a yield of 5,505,598 lb. copper from 431,397 tons of rock. Total costs were $1.349 per ton, equivalent to 10.84 cents per pound of copper, which during that year was worth 13.12 cents per pound. The lode is a bed 15 ft. wide, of comparatively soft amygdaloid, in which the native copper occurs with such uniformity as to facilitate exploitation. The conditions which have contributed to the splendid work done at this mine will be discussed in their proper place.

The Mineral Range railroad, connecting Houghton with Hancock, was completed in 1873, while the Duluth, South Shore & Atlantic reached Houghton in 1883. In 1885 Hancock and Houghton were connected by rail, over the drawbridge.

Of recent mining enterprises in the Lake Superior copper region the most important is the Copper Range Consolidated Copper Company. This organization came as the indirect result of efforts begun by Mr. C. A. Wright, as much as fifteen years ago, to bring about the construction of a railroad which should traverse the copper belt south of Houghton, and connect that town with the Chicago, Milwaukee & St. Paul railroad at Mass City, a distance of 41 miles. Owing to untoward circumstances, such as the panic of 1893 and the Spanish-American war, the plan failed until, in the summer of 1898, when, the imminent end of the war stimulating the financial market, Mr. Wright conceived the idea of combining the mineral lands controlled by the South Shore Mining Company, others owned by S. L. Smith and the Douglass estate, together with a large acreage belonging to the St. Mary's Canal Mineral Land Company, making in all a solid block of 11,500 acres. This plan was subsequently modified; no lands of the Canal Company were included. The first offer of assistance from that company was a subscription of $100,000 to the stock of the railroad, but at the time of the Spanish war this offer was withdrawn, and, after the war was over, the arrangement was changed to a bonus of 2,240 acres of land for the completion of the road, which it was apparent would develop the other large tracts of land owned by the Canal company on the South Range.

The organization of a mining and development company thus was finally carried out as the principal motive to the construction of a railroad, which should not only connect with the main line of the Chicago, Milwaukee & St. Paul railroad, but serve as the chief artery of the copper country from Mass City to Calumet. Among the projectors and chief contributors to the fulfilment of the plan initiated by Mr. Wright were Mr. W. A. Paine, of the brokerage firm of Paine, Webber & Company, Boston, and Mr. R. R. Goodell, the agent at Houghton of the Canal company.

On January 20, 1899, the Copper Range Company was organized with a capital of $2,500,000 in $25 shares[1] to build the railroad and to acquire 7,500 acres of mineral land, with the offer from the Canal company of 2,240 acres, conditional upon the completion of the railroad. The last spike was driven on December 27, in the same year, 1899, and the bonus mentioned was duly paid. In May Dr. L. L. Hubbard, in charge of exploratory work, discovered a rich copper lode on the new company's territory and this led to the combination of 600 acres of the Copper Range land with an equal acreage belonging to the Canal company, the 1,200 acres becoming the basis for the organization, in October, of the Champion Copper Company. From the very beginning this mine made a good showing.

The Champion and Baltic mines cover the same lode. When the lode was discovered by Dr. Hubbard on the Champion land, it had already been proved valuable by the workings of the Baltic. The original openings extended for nearly a mile, and they were of such promise that operations were planned on a large scale, with confidence. The lode proved to be richer than any in the region, except the Calumet & Hecla. In January, 1902, the Champion company leased one of the Atlantic's stamps; later in the year its own mill of three heads was ready. These milling operations tested the 120,485 tons of copper rock broken in the course of exploratory work. The yield was 4,165,784 lb. copper, or an average of 34 lb. per ton. In 1903 the output was 398,082 tons, which yielded 16,438,184 lb. refined copper, an average of 29.01 lb. per ton, the net earnings being $567,562, out of which $300,000 was paid in dividends.

When organized the Copper Range Company had $1,000,000 set aside for railroad construction, and $250,000 for development of mineral lands. In 1901 a branch was built to the mills on Lake Superior, and contracts were entered into with the Trimountain, Champion and Adventure mines to transport their output and supplies. Other railroad arrangements were made with the companies owning the Atlantic and Baltic mines.

Mr. John Stanton took hold of the Baltic mine in 1897; it had never previously been organized into a mining company, but desultory work had been carried out by the father of Mr. John D. Ryan, now president of the Amalgamated. A shaft 60 to 70 ft. deep had been sunk by him and a good copper lode was disclosed, but the enterprise never developed to successful exploitation. At the end of 1897, shortly after the organization of the new company by Mr. Stanton, good developments were made on a new lode; milling was begun in July, 1899, by the leasing of an idle stamp in the Atlantic mill. In 1902 the Baltic mill was completed, and of the four stamps, three crushed rock from the Baltic and the fourth the output of the Champion. In 1902 the Baltic company crushed 275,932 tons, producing 6,285,819 lb. copper, worth $746,276, making a profit of $182,762. In 1903 the production increased to 10,580,997 lb. copper, worth $1,421,211, and yielding a profit of $481,447.

In January, 1902, the Baltic mine was acquired by consolidation, the Copper Range Company being re-organized as the Copper Range Consolidated Company, to acquire the stock of the two companies. The new company, organized under the laws of New Jersey, had a capital of $28,500,000 in 285,000 shares. In September, 1903, the capital stock was increased to 385,000 shares of the par value of $38,500,000, in order to carry out the acquisition of the Trimountain mine, which at that time was in debt to the extent of $840,000; but this amount had been expended in legitimate development and equipment, the benefit of which was to accrue. The Trimountain company had got into difficulties by declaring dividends prematurely and so becoming hopelessly crippled for further development. After six months' systematic work, the new company was able to prove that the Trimountain was as rich as the Baltic. The Trimountain, Champion and Baltic are all on the same lode.

In 1903 arrangements were made with Mr. John Stanton, representing the Wolverine, Mohawk and Atlantic mines, to organize a company, to be called the Michigan Smelting Company, sixty per cent of the stock to be taken by the Champion, Trimountain and Baltic companies. The smelter was completed in June, 1904, at a total cost of about $600,000.

The Copper Range Consolidated Copper Company therefore owns 50,000 shares, or one-half the Champion mine, the railroad, the Baltic and Trimountain mines, six-tenths of the Michigan smelter, 9,300 acres of mineral land west of the Champion location and a frontage of four miles of mill-site on Lake Superior. During 1903 the combined output of the various properties amounted to 30,382,446 lb. copper, which brought $4,054,634.

The story of this important organization has been told at some length because it is characteristic of the enterprise which has developed the whole region. Moreover, the mining activities of the company are certain to gain in importance as the present systematic plans come to fruition. With a territory covering the main copper belt for 1.75 miles on its strike, and for 4 miles on the dip, this company commands an area of workable copper-bearing ground which can fairly be said to have been only tested by operations up to date. With its railroad, mills and smelter it is a self-contained enterprise of great magnitude. From my own visits to the Baltic and Champion mines, as well as to the mills and the smelter, I gained the impression of skilful, substantial work carried out under the direction of men of the highest reputation. I must confess that

[1] This is the usual capitalization of a Michigan mining company, and is the maximum allowed by the laws of the State.

until I went to Houghton, my ideas of the Copper Range were associated chiefly with the pyrotechnics of Mr. Thomas W. Lawson, and it was only by personal contact with men and things on the ground that the impression of flamboyant finance was gradually displaced by a keen appreciation of a mining business, the magnitude and substantial character of which it required many days of observation to rightly understand.

ELECTRICAL EQUIPMENT FOR A SPANISH COLLIERY.—A contract has been placed in Great Britain by the Alquife Mines & Railway Company for a complete electrical plant for mines in the south of Spain. The Alquife Mining Company has secured the water

HEAD-FRAME OF TAMARACK No. 3 SHAFT.

rights of the Rio Alcazer, and from this river they are able to get under the worst conditions from 3,000 to 4,000 h. p. with a fall of 280 ft. The electrical plant consists of a 300-h. p. double Pelton wheel with a special form of governor, the wheel being directly coupled to a Scott and Mountain's three-phase alternating-current generator of 250 kw. capacity. This generator delivers a three-phase current at 500 volts to a transformer, where it is transformed to 5,500 volts, and conveyed from the power station to the mine, a distance of nearly 10,000 meters, by bare overhead wires. At the mine, the current is again transformed down to 500 volts by means of step-down transformers for the power motors, and to 250 volts for the lighting of the private houses, workshops and offices. At the mine, there will be installed two motors of 100 h. p. each for driving the briquetting machinery, and six 15-h. p. motors for driving the hoists; also nine 5-h. p. motors for driving the feeding gear from the kilns, hoists, workshops, etc. About 275 incandescent lamps also will be installed.

THE IODIMETRIC DETERMINATION OF COPPER.

By Andrew M. Fairlie.

In the published description of the iodide assay for copper, the precipitation of the metal has been variously accomplished—by the use of sodium thiosulphate, hydrosulphuric acid, metallic zinc and metallic aluminum.[1] The last-named agent has been the favorite among analytical chemists, as the copper is neatly precipitated by it in a form which is easily washed and readily dissolved in nitric acid. Although a marked improvement over the other precipitants proposed, its frequent use leads to the impression that the iodide assay for copper is a tedious proceeding. Specific objections to the precipitation by aluminum are:

1. Time consumed.
   (a) In evaporating the nitric acid from the original solution.
   (b) In precipitating the copper on the aluminum.
2. Danger of loss by spattering during the evaporation.
3. Introduction of iron from the precipitant into the assay.

In the method here described these objectionable features are all eliminated. Evaporation is unnecessary; the copper is completely precipitated as soon as the reagent is added; and the precipitate is free from all interfering elements.

The precipitant used—ammonium or potassium thiocyanate—is by no means a new reagent in the determination of copper. Its use has been described in two permanganate methods,[2] a cyanide method,[3] a silver nitrate method,[4] an alkalimetric method,[5] and an electrolytic method.[6] It seemed feasible to adapt to the iodide assay this mode of precipitation which had given such excellent results by other methods; and to test the practicability of the idea some experiments were made. Weighed amounts of copper foil and of iron wire were dissolved in a dilute mixture of nitric and hydrochloric acids, the solution was made ammoniacal, and then acidified with sulphuric acid. The copper was then precipitated as cuprous thiocyanate, and the subsequent operations were carried out according to the scheme outlined below. The separation of copper from iron was complete in every instance, and the accuracy of the method is shown by the following data:

Number of Experiment.	Copper Present, Grams.	Iron Present, Grams.	Copper Found, Grams.
1	0.1578	0.0834	0.1574
2	0.1754	0.1706	0.1746
3	0.1784	0.3424	0.1781
4	0.1995	0.2080	0.1993
5	0.2394	0.1068	0.2394

As a further test of the process, it was matched against the electrolytic assay, and some comparative determinations were made on various grades of cupriferous material. The results of these assays are tabulated as follows:

Character of Sample.	Percentage Copper Found.		
	By Electrolysis.	By Thiocyanate-Iodide Method.	
		A.	B.
Ore	13.71	13.66	.....
Concentrate	29.70	29.68	.....
Matte	48.55	48.60	48.62
High matte	55.72	55.75	55.82

The figures require little comment. Not only were the results with thiocyanate better than had previously been attained with aluminum, but a determination by the new method required much less time, and less anxiety on the part of the chemist. Accordingly, in the laboratory where these experiments were made, the so-called 'iodide assay' has been superseded by the new method, which for distinction may be called

THE THIOCYANATE-IODIDE ASSAY FOR COPPER.

Solutions required:

1. Sodium thiosulphate—about 19.5 grams per liter.
2. Potassium iodide—50 per cent solution.
3. Starch—0.5 gram boiled with 20 c.c. water. Dilute with 150 c.c. hot water and allow to cool and settle. Decant the clear solution.
4. Ammonium thiocyanate—100 grams per liter.

Standardization.—Weigh accurately about 200 mg. copper foil, place in a 300 c.c. Erlenmyer flask, and dissolve in a 5 c.c. dilute nitric acid (1:1). Add 50 c.c. water, and boil five or ten minutes to expel completely red fumes. Add ammonia to slight but distinct alkalinity, and again bring to a boil. Acidify with acetic acid and cool. When cold, add 6 c.c. potassium iodide solution, whirl the flask to mix the solutions, and run in from a burette the sodium thiosulphate solution until the brown color of the iodine liberated is barely per-

[1] In connection with this article the reader is referred to the description of the iodide assay for copper as given in Peters 'Modern Copper Smelting,' 12th ed., p. 59.

[2] Parr: *Journal* American Chemical Society, 1900, p. 685; and 1902, p. 580. Meade: *Chemical News*, Vol. LXXX, p. 685.

[3] Johnson: *Journal* Society Chemical Industry, 1889, p. 603.

[4] Henriques: *Journal* Chemical Society, Vol. LXIV part 2, p. 345.

[5] Garrigues: *Chemical News*, Vol. LXXVII, pp. 41, 52

[6] Olsen: 'Quantitative Analysis,' p. 207.

ceptible. Add 2 to 3 c.c. starch solution, and continue the titration to the appearance of a pure cream color. The weight of copper taken divided by the number of cubic centimeters of thiosulphate used will give the equivalent of one c.c. of thiosulphate in metallic copper.

Assay of Ore, Concentrate, and Matte.—Take for analysis such a weight of material as will contain from 100 to 240 mg. of copper. Brush the weighed sample into a 250 c.c. beaker, and sprinkle over it about two grams of granulated potassium chlorate. Add 10 c.c. nitric acid (1.42 sp. gr.), and cover the beaker instantly. Allow to stand a few seconds, then rotate the beaker gently until the violent action ceases. Heat gently until nitrogen peroxide and chlorine fumes are completely expelled, allow to cool a minute, and add 10 c.c. hydrchloric acid (1.2 sp. gr.), keeping the beaker covered as closely as possible. Heat again, and boil a minute or two. If these operations have been properly performed, all the sulphur in the ore will be oxidized, all the copper will be in solution, and the residue will be clean, white sand. For ordinary work this need not be filtered off. Cool the beaker again, dilute with 50 c.c. cold water, add ammonia in excess, and then barely acidify with dilute sulphuric acid (1:1). Heat to just below the boiling point, add 10 c.c. sulphurous acid, and stir. If the iron is not completely reduced, add more sulphurous acid. Precipitate the copper with 5 c.c. of the solution of ammonium thiocyanate. Stir, allow to settle a minute, filter, and wash with hot water. Most of the precipitate will now be on the filter paper, and a little will adhere to the beaker and stirring rod. With a few drops of nitric acid, dissolve this adhering precipitate, dropping the acid wherever it is needed. Wash down the sides of the beaker with about 10 c.c. of water. Now transfer filter paper and precipitate to the beaker in which the precipitation was made, add 2 c.c. strong nitric acid, and cover. Warm until the cuprous thiocyanate is dissolved, and then boil gently to complete expulsion of red fumes. To secure the best results, the filter paper should be strained off and thoroughly washed, but ordinarily this step may be omitted. Add ammonia, boil, acidify with acetic acid, cool, add 6 c.c. potassium iodide solution, and titrate, all exactly as described in the directions for standardization.

Notes.—1. The method of attacking the sample is severe, but efficient and time-saving. If a sulphide ore is boiled at once with nitric acid alone, sulphur will collect in balls which may contain particles of undecomposed ore. Complete decomposition may be effected by nitric acid alone by heating slowly, but this delays the results.

2. Before adding the sulphurous acid, the solution should be nearly neutral. Strongly acidified solutions of ferric salts are not rapidly reduced by sulphurous acid.[1]

3. A large excess of ammonium acetate prevents the completion of the reaction between acetate of copper and iodide of potassium. Therefore, only a small excess of ammonia should be added to the nitric acid solution of the cuprous thiocyanate.

4. Low results are usually due to partial loss of the cuprous thiocyanate. This precipitate is light, and tends to creep up beyond the edges of the filter cone during the washing. All particles adhering to the funnel should be recovered by wiping out with moist filter paper.

5. It is not expected that the above process will prove to be exactly appropriate to all kinds of ores; the analyst who has a variety of materials to work upon will find scope for his own initiative. It is believed, however, that in any case the precipitation by thiocyanate will be found preferable to that by aluminum, as a preliminary to titration with sodium thiosulphate.

[1] Brearley and Ibbotson, 'Analysis of Steel Works Materials,' p. 108.

NOTES FROM PINAL COUNTY, ARIZONA.

SPECIAL CORRESPONDENCE.

The Santa Fé, Prescott & Phoenix railroad has been extended from Phoenix up the Gila river as far as Winkleman, which is near Dudleyville, or at the point where the San Pedro joins the Gila. The undoubted plan of the Santa Fé is to extend this line up the Gila to Deming, or some other eastern connection. The company is likewise constructing a line from Wickenberg westerly, with the intention of crossing the Colorado river at or near Parker, and joining its present line west of The Needles in California. Thus a through line will eventually be opened via Deming, the Gila valley, Phoenix and Wickenburg, which will be shorter and have a much easier grade than the La Junta, Trinidad and Albuquerque route. The further plan is to extend the line from Dudleyville up the San Pedro to a connection with El Paso & Southwestern at Benson. These matters are noted because they are destined to be factors in the development of the mining resources of the territory traversed. Pinal county has thus far been at a great disadvantage by reason of long distance from railroad connection. Conditions are now brightening by reason of the Santa Fé's Gila valley line being constructed, which touches Florence, Kelvin and Dudleyville, and which later will strike Mammoth, on the San Pedro. The importance of the latter extension is that it will give Pinal mines direct transportation to the smelters at Douglas and El Paso, and there is a possibility of a smelting plant being erected at Benson.

Thirty miles east of Florence, on Queen creek, is the group of the Lake Superior and Arizona Mining & Smelting Company, under the management of Mr. Alfred C. Seiboth. The plan of this company is to build a railroad from Florence to Superior, the latter being the name of the company's camp. As soon as the mine is sufficiently developed, and when the railroad is built, the company expects to erect a smelting plant at Superior. The orebodies here are mainly in the lime, near a contact with quartzite. It is in the same character of formation and ore occurrence as that of the old Silver King, in the same locality, which was a great silver producer 25 years ago. But the ores of the Superior mine comprise copper carbonates and oxides, associated with iron and manganese. There is also some gold and silver, the gold up to $10 per ton. Shipments of 250 tons of assorted ore ran 34.5 per cent copper. The medium grades are being held for treatment on the ground. Development has reached 300 ft. depth in a shaft, and a further distance into the hill. Steam power is used, with oil as fuel, the latter costing $1.63 per bbl. at Florence, plus a wagon haul of 30 miles. Mr. Seiboth has recently installed at the mine a Rand cross-compound Corliss air compressor, equal to 1,200 cu. ft. of free air per minute. This machine will not only do the drilling, but the hoisting and pumping.

Interest in the vicinity of Kelvin centers in the Ray mine, where, as is known, a large amount of money was expended between five and eight years ago. The mine is on Mineral creek, six miles from where it empties into the Gila, at Kelvin. A railroad was built from the river up Mineral creek to the mine. A small concentrator was built at the mine and a much larger one at Kelvin. Buildings were erected at both ends of the road, and the mine was considerably developed by shafts, adits and winzes, exposing a large tonnage of copper carbonate, copper glance and pyrite. These orebodies, which appear to exist in lenses, shoots and chimneys, are in an igneous formation, the ores being carried by a quartz-porphyry gangue. The formation is cut by intrusive porphyry dikes, which are mineralized. The work has reached a depth of 350 ft. in various places, the stopes and drifts disclosing extensive copper mineralization, accompanied by some gold and silver. But these large orebodies are not claimed to be high-grade. About 3 per cent copper would be the average. Mr. C. M. Gordon has been in charge of the property since work was suspended four years ago. Mr. Gordon states that steps are being taken to resume work in some directions at the close of this year. The mill at Kelvin was equipped with 10 gasoline engines, which were connected to a common shaft; but, as they could not be made to work in unison, they were unsatisfactory as a source of power. It is hardly likely that this mill will be tried again without material changes. Other holdings in the vicinity of the Ray are those of the Big Lead Mining & Smelting Company, represented at Kelvin by Mr. W. B. Twitchell, who is preparing to develop the property. The Dewey group, located in 1898 by P. A. Schilling and associates, is on the east side of Mineral creek, on a contact of limestone and porphyry, the ore being mostly in limestone. Development has disclosed 4 ft. of copper carbonate.

The property of the Troy-Manhattan Copper Company is situated about six miles northeast of Kelvin. The camp is called Troy, where there is a post office of that name and a store. Mr. C. H. Cutting is manager, with Thomas Kavanaugh and J. C. Devine as superintendent and foreman, respectively. There are about 1,000 acres in the holdings, and the development in the form of shafts, adits, cross-cuts, winzes, raises and drifts represents about 30,000 ft. of work. On the surface are two or three hoisting plants, an air compressor, a small concentrating mill and a small smelting plant. The smelter and mill are chiefly for testing purposes. At present the mill is concentrating wulfenite ore, which was found in some parts of the mine. The country here has a lime capping, beneath which comes quartzite, followed by granite. This formation is cut by dikes. The veins are usually on the contact of these dikes with the lime and quartzite. The gangue varies much, comprising lime, quartzite and porphyry. The ores consist of carbonates and oxides of copper, with copper and iron pyrites appearing at greater depth. The oxidized ore is estimated to contain 8 per cent copper; there is also some gold and silver in the ore. The iron and copper are said to be in mechanical combination, not chemical. A 2,000-ft. adit gives a depth of 800 ft. below the surface. A crosscut from this adit runs to a raise that connects with a shaft. The building of a smelting plant on the Gila river, near Kelvin, is a probability in the near future.

COPPER ORES IN THE CASCADE MOUNTAINS.

By R. H. Stretch.

The sulphide ores of copper occur in so many localities on the western slope of the Cascade mountains, in the State of Washington, that a few notes as to the connection of these outcrops with the associated rocks possibly may be of interest. As my acquaintance with Snohomish county is more complete than with the region either to the north or south, the following generalizations refer principally to that part of the State. The conditions which have made the outcrops visible do not exist so perfectly to the north in Skagit county; and still further to the north, round Mt. Baker, quartz gold ores occur, which seem to be nearly, if not totally, absent in Snohomish. The only remaining evidence of their former existence is to be found in a few local placers of small area, such as those of the Sultan river, below the cañon, and those which gave the names of Gold Bar and Gold Run to camps now abandoned. These points lie to the west of the copper belt, on a nearly parallel line, and may indicate a different era of mineralization.

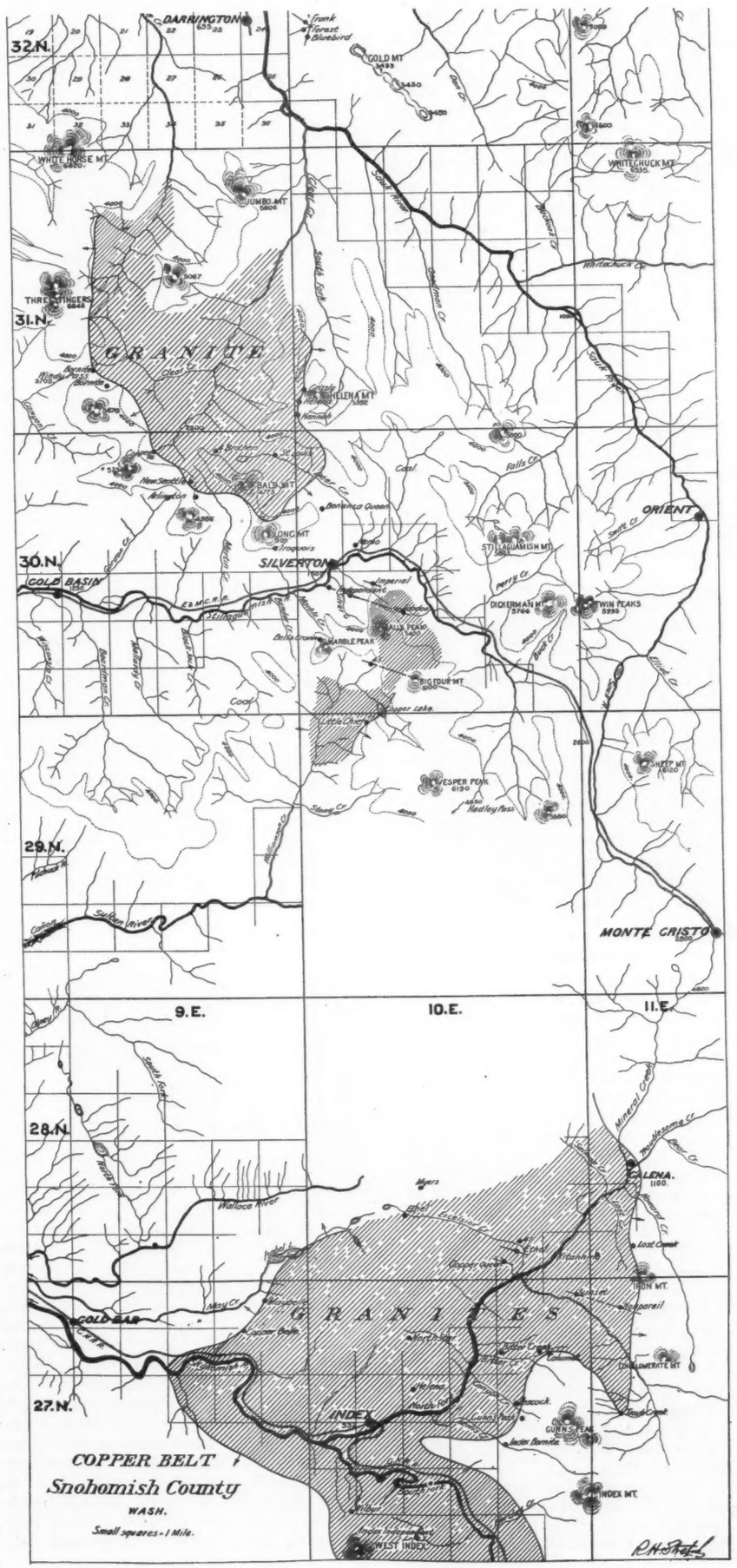
The copper belt extends 36 miles across the country, in a line somewhat west of north, with a width of only a few miles, and is quite distinct from the Monte Cristo region to the southeast, in which we encounter a different series of rocks and ores.

The main physical features are shown on the accompanying map. The belt may be naturally divided into four regions, each covering about nine miles north and south, namely, the Index, Sultan Basin, Silverton and Darrington sections, all of which, except the Sultan Basin, are accessible by rail.

The copper belt follows a granitic uplift later than the overlying sedimentary or stratified rocks, by the erosion of which the ores have been exposed (mostly along the crest of the uplift, down to the underlying granite, and owing to the carving of the latter by the present water-courses) to a depth of some 2,000 ft. This erosion shows the granite axis as a series of huge bosses, with the more or less quaquaversal dip of the sedimentaries, and has resulted in a structure like Fig. 1, which is an east and west section through the Clear Creek basin, where the granite area is surrounded by lofty escarpments of stratified rocks. The same structure is common everywhere, and is strikingly shown southwest of Index, on the flanks of West Index mountain. The Clear Creek basin has been carved out of the most northerly of the granite bosses, this rock dipping beneath the level of the Sank valley before we reach Darrington (altitude 650 ft.), so that the structure just described there is not possible here.

The rock series thus exposed is shown to consist of quartzites, schists and coal-bearing sandstones, followed by limestones, in succession upward, the schists being interbedded with quartzites and probably altered eruptives. In the southern region there is frequently found a thin bed of quartz shale, cemented breccia or conglomerate fading gradually into the quartzites, just as these merge into the schists, showing continuous deposition, and probably an overlapping of one series by another.

Copper sulphide ores occur interbedded or on the contact, for a distance of several hundred feet upward, but apparently diminish in quantity, or disappear altogether, before we reach the overlying sandstones; the mineral outcrops therefore decrease in number as we leave the areas of erosion which have exposed



the granite contact and lower members of the stratified series. This succession of rocks above the granites, with interbedded ore lenses, is strikingly shown on the north side of the Clear Creek amphitheatre, where the series dips west from 50° to 60°, with an exposure 2,000 ft. thick of the overlying series, and a sky-line like the teeth of a saw. (See Fig. 1.) This simple structure is repeated to the west, as proved on the line of the Everett & Monte Cristo railroad, and there is much reason to believe that ore would be found in many places on or near the contact, over a large area, by sinking; but the uncertainty as to depth and distribution of the ore lenses precludes the necessary exploration.

In the granites themselves, the ore occurs in the form of veins controlled by the extensive sheeting to which the district has been subjected, though there are few evidences of faulting on a large scale, unless it be on the north fork of the Skykomish river, in the Index region. The most pronounced system strikes east and west, tending slightly to the northwest in the Index section, but to the southwest north of Silverton. The sheeting is nearly vertical, and often individual planes can be traced for long distances, and are not infrequently so close together that two adjacent ones have been mistaken for the two walls of a vein. A minor northeast and southwest structure, nearly parallel to the general course of the Skykomish river above Index, is well seen in lofty vertical bluffs near that place, and is one of the evidences of faulting.

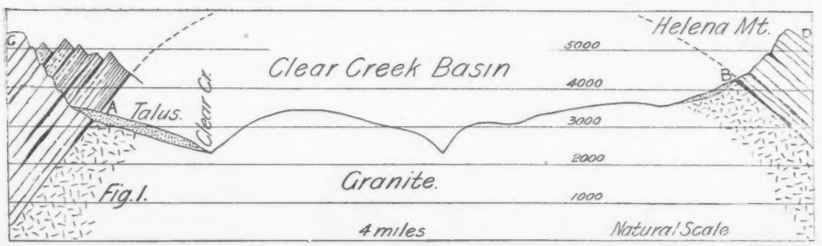


Fig. 1.

The majority of the mining locations have been made on the contact exposures, or on the east-west sheeting system. Where erosion has exposed the granites to considerable depth, mining locations become few in number, and evidences of mineralization diminish, as on the center of the Clear Creek basin. As a natural result, the great bulk of the locations are found at considerable altitudes round the granite bosses, and lower down, chiefly in the depressions between these masses; or, in other words, the great bulk of the locations appear to cover a zone, which includes the exposure of the lower members of the stratified rocks and the upper portion of the granites.

As previously stated, faulting is not specially in evidence, nor does the presence of ore seem to have any intimate connection with intrusive action, unless it be in the extreme northern area. Dikes are rare, and appear most frequently in the Darrington section, as might be expected from the neighborhood of Glacier peak and other extinct volcanic cones to the eastward. At the base of White Horse mountain the presence of serpentines, with asbestos and associated minerals, indicates considerable metamorphism.

The occurrences of ore may be grouped under several heads: first, contact or interbedded deposits; second, veins proper, under which head we may distinguish those which outcrop in the stratified rocks (A), and those in the granites (B). Some of the most promising explorations have been made in the first group, but it is questionable whether their true character was understood until a comparatively late date. While essentially chalcopyritic in character, marcasite and pyrrhotite are frequent associates, and immediately on the contact we often find, in addition to quartz, garnet and epidote, both realgar and molybdenite, with, at least in one case, cobalt. The true veins are generally not far from vertical, and while of common origin (the sheeting planes) differ in the two groups A and B, as might naturally be expected from the different physical character of the two rock series. In the group A the vein is frequently a shear zone of considerable width, with overlapping lenses of ore; while in the granite the fissure is cleaner cut, much narrower and with more definite walls.

The metallic content of the two groups is also strikingly dissimilar. Group A has for its principal minerals galena, pyrrhotite, marcasite or other iron pyrite, and arsenical pyrite often in the form of löllingite with zinc blende. Group B is characterized by chalcopyrite and bornite, with the chief minerals of group A mostly absent; small amounts of galena, zinc blende and micaceous hematite constitute the principal minor metals, with more or less quartz, calcspar and strontianite in those fissures, which show by the presence of talcose products the strongest evidences of vertical motion. In the deepest workings (about 1,000 ft.), the galena and blende appear to have disappeared, and the bornite nearly so, leaving a mixture of copper sulphide and hematite.

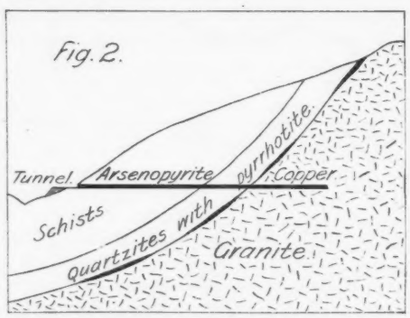


Fig. 2.

The association of the various minerals with certain rocks is so marked that it is usually easy to predicate the type of the latter from hand specimens of ore. Pyrrhotite is associated chiefly with the quartzites, and when massive, as in some of the interbedded deposits, it has a low gold tenor; but when found in the veins, in association with abundant quartz, the gold assays may range from $10 to $200 per ton. There is no nickel. Arsenical pyrite is associated with veins in the schistose rocks and is characteristic of them, carrying gold and some silver. The altered product, realgar, is a constant associate of the schist-granite contacts, and is found as stains in the deepest schist-vein workings (about 800 ft.). The chalcopyrite in the granite is less contaminated with iron pyrite than in the bedded deposits, and is poor in gold and less rich in silver than the bornite. In the bedded deposits, the copper ores are apparently richer in gold when associated with the schists than with the quartzites.

The general association of these rocks may be summarized in Fig. 2, which is self-explanatory and suggests the overwhelming importance of a geological examination of the country before expending large sums of money on development. Not only the life of the mine, but the style of equipment, depends on a clear knowledge of the probable depth at which we may expect to encounter such a change in the rock formation as will seriously affect the quantity and character of the ore in the vein, and probably render a reconstruction of the reduction works necessary.

It is not necessary to discuss the bedded veins further, as, at whatever depth they occur, their relationship to the rocks will remain the same, and variation will probably be chiefly in the relative proportions of the associated minerals. The chief interest centers in the granite veins, as there is every reason to believe that all fissures in the stratified rocks ultimately will penetrate the granite and change their character, as at the Midas mine in the Cascade region to the north, where a vein of high-grade silver ore several feet wide in black schist can be seen cut down squarely to a few inches on entering the granite, with a total change in the vein-filling.

Many thousand feet of tunnels on these granite sheeting-planes show usually nothing more than a narrow crushed belt of granite, with parallel stringers of chalcopyrite, thin lenses or sometimes thin sheets of considerable extent, and frequent barren zones. This ore may be considered the primary filling, and is not usually of commercial value, because of the limited quantity, though of course high assays in copper may be secured from picked samples. In some few cases secondary enrichment has taken place in the upper zone previously referred to, but the sum of the evidence goes to show that the deepest workings have proved to be below the zone of enrichment, which was probably controlled by the level of the water and ice which have deposited such enormous bodies of débris, in the shape of blue clay and gravels, in the river bottoms, totally obscuring any vein outcrops for several hundred feet above the present water level, except where cut out by the rivers.

There is much evidence to show that at least a portion of the filling of the veins, in the granite below the contact, may have been derived by downward filtration from the superincumbent cupriferous strata. Large bodies of granite near Index are stained blue by copper carbonates; thin knife-blade crevices are filled with chalcopyrite, bornite and molybdenite, without alteration of the enclosing granite, and chalcopyrite crystals are coated with a thin film of bornite; while many ore masses, apparently of the latter metal, enclose a core of unaltered chalcopyrite.

It only remains to call attention again to the risks attendant on the development of veins which are purely in the granites, and to caution those who are developing veins in the stratified rocks to look ahead far enough to know what may be expected in the future.

THE OPERATION OF A TUBE-MILL.*

BY HERMANN FISCHER.

The operation of grinding in a tube-mill is carried out in a closed receptacle; one can only see the incoming and outgoing material and hear the noise in the interior of the revolving drum. As for the rest, one must fall back upon a comparison with known operations of an analogous character. For this reason, the opinion has been generally held that the balls roll on the slope of the drum, inside the whirling mass, crushing the ore between them, until it passes from the feed to the discharge at the lower end of the drum.

By means of special arrangements, the firm, Fried. Krupp A.-G. Grusonwerk, of Magdeburg-Buckau, have now rendered it possible to observe the operations in the interior of the drum. These observations prove that the explanation hitherto accepted is fundamentally wrong, that the tube-mill does not appreciably grind the ore, either on the slope or in the interior of the whirling mass, but crushes it by an inclined beating action, and that the higher position of the feed, as compared with the discharge, is of no importance for conveying the material.

For the purpose of experiment, a glass drum

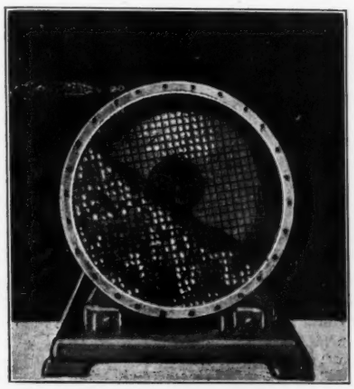


FIG. 1.—BEGINNING OF ROTATION; 1 METER DIAMETER.

was first used; then a larger one was constructed, in which the inspection of the interior of the drum was rendered possible by an exchangeable grating, and, finally, a drum of 1 m. (39⅜ in.) interior diameter, of similar construction, was employed. This was first operated without material, and then with material of different kinds, which would not give off dust, at varying speeds of rotation.

The discharge end of the drum was closed only by a wire grating, Fig. 1 and 2, so that the interior was clearly visible. The drum contained only flint balls, about 60 mm. (2⅜ in.) in diameter. The height of arch of this charge was about 450 mm. (17¾ in.) when the drum was in a state of rest. The drum was then turned slowly by hand, until a few balls began to move on the surface. Fig. 1 represents this stage. Then the speed was raised to 21 and 23½ rev. per min.; the balls rolled rather slowly down the slope; the height of the mass increased a little. As the speed increased to 28, 30 and 32 rev. per min., the motion on the free side became more lively, and the mass became visibly loose; the height increased to about 600 mm. (23⅝ in.). Fig. 2 is an instantaneous view of the operation when the drum was revolving at 32 rev. per minute.

*Abstract from the *Zeitschrift* des Vereines Deutscher Ingenieure, March, 1904.

The balls, which are in contact with the drum below and on the ascending side, are carried along without changing their position relatively to the wall of the drum, until they separate therefrom at a certain height and describe a distinct curve of projection. The balls further inward likewise do not change their position with regard to the drum when ascending,

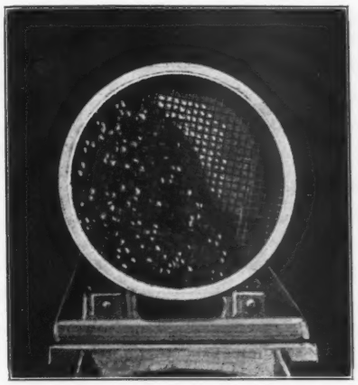


FIG. 2.—MILL ONE METER DIAMETER. 32 REVOLUTIONS.

FIG. 3.—MILL 300 MM. DIAMETER. 59 REVOLUTIONS.

FIG. 4.—MILL 300 MM. DIAMETER. 66 REVOLUTIONS.

but a curve of projection is hardly perceptible on the descending side. On comparing Fig. 2 with Fig. 1, it will be seen that the contents have become looser. As the speed accelerates to 35 rev. per min., this tendency is more marked, so that the height increases to 650 mm. (25⅝ in.). The curve of projection of the balls, which were raised when in contact with the drum, is clearly visible, as is also the fact that the balls further inward are separated in layers. On the ascending side, about 200 mm. (7⅞ in.) from the wall of the drum, a few balls roll in a hollow space of oval cross-section without intermingling with those moving further onward. The hollow spaces between the several layers on the descending side are visible throughout, while on the ascending side the layers are close to each other. Fig. 3 and 4 are instantaneous views, obtained with a drum, 300 mm. (11 13-16 in.) in diameter and revolving at 59 and 66 rev. per min. A comparison shows clearly how the looseness of the contents increases with the speed. If the speed of rotation is further increased, the balls form a solid ring, revolving with the drum; a shifting of the balls is not perceivable. Fig. 5 is an instantaneous view, when the drum is revolving at a speed of 55 rev. per minute.

A large quantity of material, producing no dust, was now introduced. This material, moving in the same manner as the balls, as was anticipated, entered the hollow spaces between the balls, and ascended and descended with them. A difference was only noticeable in so far as the precipitated layers were less sharply marked, and the particles of material were spurted laterally, especially at that spot

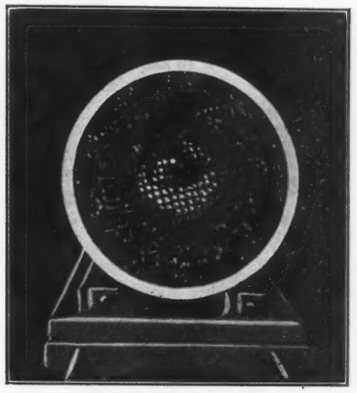


FIG. 5.—MILL ONE METER DIAMETER. 66 REVOLUTIONS.

which was hit by the mixture rushing down like a water-jet. Hardly any material was noticed in the contracted oval hollow space.

I have already stated that a sliding or rolling motion between the balls, or between the balls and material, does not take place except at the striking point and in the oval-shaped hollow space. Since the latter is almost free from material, a crushing action—at least, one of any importance—can only take place at the striking point, where the falling balls are violently forced upon the material between them and the balls which have been previously operating. The former play the part of the shoes in a stamp-battery, and the latter act as a substitute for the dies. The crushing is effected by stamping or beating. The action, however, differs from that in stamp-batteries, in so far as the horizontal motion of the falling balls is opposite to that of the balls revolving with the drum.

Owing to the force of the strokes, the balls near the striking point will undergo a certain displacement, which, however, can hardly produce a crushing action of any importance. The crushing action thus depends on the height of fall of the balls—that is, on the height of the vertex of the path of projection over that point where the balls strike—on the speed of the

drum, and on the weight and the number of balls. The speed of the drum must be so chosen that the paths of projection can be well developed. Weight of balls and height of their fall supplement each other, in so far as they are factors of a product. Harder material requires heavier balls, or a greater height of fall than softer material, and steel balls can have the same efficiency in smaller drums as flint balls in larger drums. The larger the quantity of balls acting on a certain quantity of material, the better the crushing. If more material of the same kind is to be crushed to the same degree of fineness within a certain period, the quantity of balls—and, consequently, the length of the drum—must be greater. The respective numerical values can only be obtained on the basis of extensive experiments.

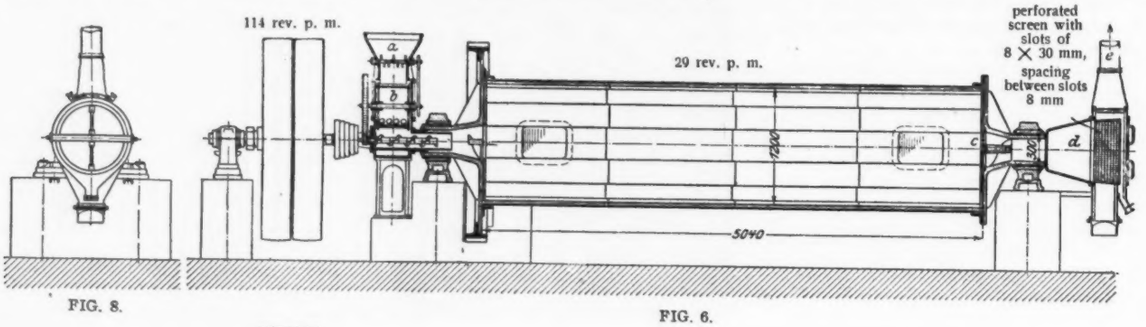


FIG. 8.

FIG. 6.

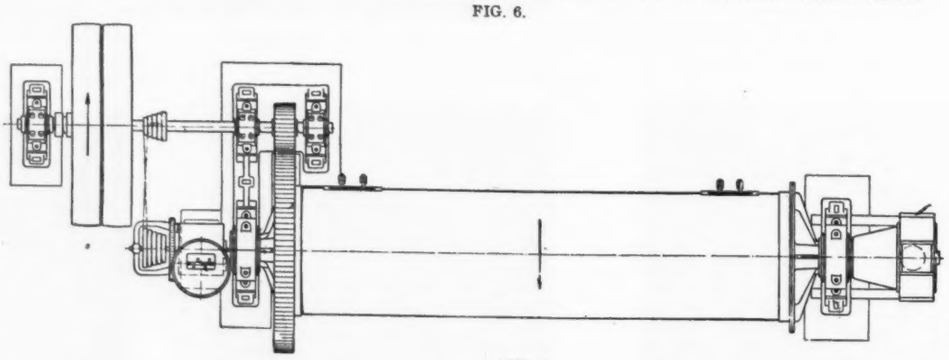


FIG. 7.

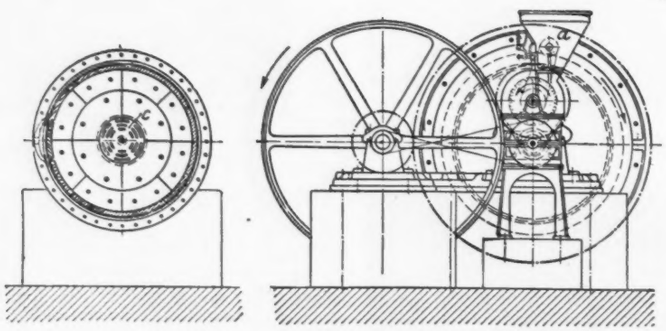


FIG. 10.

FIG. 9.

In the further course of the experiments, the discharge end of the drum, Fig. 10, was closed by means of sheet metal, having in its center a trellised opening of 200 mm. (7⅞ in.) diameter. To the feed-end was fitted a hollow cone, *c*, of sheet metal. The opening of this cone on the drum side—500 mm. (19 11-16 in.) diam.—was trellised and partly covered by a fixed plate, *e*, secured to the machine frame, as represented in Fig. 9. The material was now introduced through a manhole, and the drum was set in operation at the rate of 32 rev. per min. A further quantity of material was thrown into *c* by hand-shovels. It was readily taken through the free opening of the grating, so that each shovelful rapidly vanished. On the outlet side, the material was discharged through the meshes of the grating, conformably to the curve of projection. *The discharge of the material thus took place at a considerably higher level than the feed-opening.*

Consequently, the progressive motion of the material from the feed-end to the discharge—which is required by the tube-mills (ball-mills without sieves at the curved wall of the drum)—does not depend on a difference of height between inlet and outlet. It is only necessary that the inlet opening be situated where the contents of the drum are loose enough to receive the material, or where the drum is empty, and that the moving contents of the drum pass by the outlet. The drum acts like an elevator; it lifts the balls and material innumerable times to a considerable height. In view of the sum of these risings, not even the greatest possible difference in height between inlet and outlet end would be of any influence.

By what means is the material compelled to pass through the drum? That material upon which a falling ball drops will spurt on all sides and be taken up into the neighboring hollow spaces. If much material is situated on the point of stroke, much material will be distributed therefrom; otherwise, little. Consequently, those parts of the contents which are richer in material deliver more than is returned by the parts poorer in material, whereby the proportions of the mixture are equalized. Owing to the great activity with which the contents of the drum rise and fall, it was observed that some balls passed over their path twice during one revolution; this equalization takes place very rapidly. At the discharge end, the material which spurts aside passes through the meshes of the latticed opening, while the balls are retained. Thus, at this side, the mixture will be poorer in grinding material, so that the said equalization is directed hither.

Fig. 6 is a longitudinal section, and Fig. 7 a plan of a tube or grit mill; Fig. 8 a cross-section of the drum; Fig. 9 a view of the feed-end, and Fig. 10 a view of the discharge end of the mill. The drum has an interior diameter of 1,200 mm. (3 ft. 11¼ in.), an interior length of 5,000 mm. (16 ft. 5 in.), and revolves at the rate of 29 rev. per min. The drum consists of sheet iron, 12 mm. (15-32 in.) thick, has cast-steel ends, and is lined with hard cast-iron plates. The grinding balls are introduced through a manhole, while the material to be crushed is fed and discharged through the hollow trunnions cast together with the end walls. The material passes first of all into the hopper, *a*, in which a studded shaft rotates; a longitudinally-grooved drum, *b*, regulates the supply. This drum is rotated by toothed wheel gearing and a pair of five-step pulleys at different speeds, and contains a few balls, which serve to shake the drum, and thereby ensure the emptying of its grooves. The material supplied is moved by a screw-conveyor into the hollow trunnion on the left side, Fig. 6, and then passes into the drum, through the latter and through the grating, *c*, into the outlet trunnion on the right side. The inlet trunnion, on the left side, has the blades which prevent the balls from dropping out. The grating, *c*, is provided with arcuate slots of about 25 mm. (1 in.) in diameter. The material passes therefrom into a hopper, *d*, attached to the trunnion. A perforated screen is connected to the hopper. The slots of the screen are 8 mm. (5-16 in.) wide and 30 mm. (1 3-16 in.) long; they permit the crushed

material to drop through, while very hard particles which are not crushed and splinters of flint are retained and subsequently drop out on the right side, Fig. 6. The sieve is enclosed by a casing, out of which the air is drawn by means of the pipe, *e*, so that air enters all permeable parts, thereby preventing the exit of dust. A great advantage of the mills, in which the material is fed and discharged through the hollow trunnions of the drum, consists in the facility of rendering the same free from dust. If, however, the discharge is effected through slots in the drum casing near to the rear end, a comparatively tight closure is not possible, and the non-exit of dust cannot be guaranteed by the suction of air.

These mills are made with a width of 0.95 to 1.5 m. (3 ft. 1⅜ in. to 4 ft. 11 in.), and a length of 4 to 8 m. (13 to 26 ft.). The efficiency depends to a large extent on the kind of the material treated and the degree of fineness desired, and, of course, also on the initial size of grain, which is obtained by preliminary crushing.

SAULT STE. MARIE CANAL TRAFFIC.

Although November business was very large, amounting to over 5,500,000 tons of freight, the total movement of freight through the Sault Ste. Marie canals for the season up to November 1 is less than the corresponding period in 1903 by 5,706,244 tons. The total freight passing through the canals this year was 25,663,541 net tons, of which 19,333,202 tons were east-bound, and 6,330,339 tons west-bound. The falling off this year was chiefly in east-bound freight, and was due to the lighter tonnage of iron ore. In west-bound freight there was a loss in coal, but comparatively little in other items. The total number of vessel passages for the season this year was 13,354, showing an average cargo of 1,922 tons.

The items of mineral freight included in the total above are given in the following table, the figures being in short tons, except for salt, which is given in barrels:

	1903.	1904.	Changes.
Anthracite	1,034,211	818,998	D. 215,213
Bituminous	5,197,255	3,818,694	D. 1,378,561
Total coal	6,231,466	4,637,692	D. 1,593,774
Iron ore	20,538,577	16,134,123	D. 4,404,464
Pig and man'f'd iron	162,821	188,212	I. 25,391
Copper	91,658	83,417	D. 8,247
Silver ore		1,313	I. 1,313
Building stone	14,790	25,611	I. 10,821
Salt, bbl.	362,407	329,882	D. 32,525

There is no prospect yet of an early closing of the canals, although at this time of year it is possible that cold weather may set in any day. The indications are that the season will close with comparatively light coal and iron ore movements, which means that the stocks of coal on the upper ports, and those of ore at the Lake Erie ports, will be lighter than for two years past.

ELECTRICITY IN BRITISH COLLIERIES.—The London *Iron & Coal Trades Journal* says: "Among the collieries that have already adopted the electric drive, or shortly will do so, are: The Denaby and Cadeby Main collieries, Helm, South Pelaw, Pelton, Bolsover, Grassmoor, Strafford Main, Sheffield Coal, Staveley Coal & Iron Company, West Hallam, Shipley, and Pickup, Ltd. At the last-named colliery two rope-driven alternators are installed, supplying power to 50-h. p. induction motors working underground haulage, and two similar motors of 15 h. p., driving circular saws and pit bank machinery."

MINE INSPECTORS IN PENNSYLVANIA.

We have heretofore commented in the JOURNAL on the present system of electing mine inspectors in Pennsylvania. Our comments are supported and corroborated by the Chief of the Department of Mines of that State, Mr. James E. Roderick. In his yearly report, recently issued, he comments on the present law so ably and forcibly that we reproduce his remarks, almost in full:

The first general anthracite mine law of Pennsylvania was enacted by the Legislature in 1870. In 1885 it was revised in accordance with the recommendations of a commission consisting of six miners, three operators and six inspectors, appointed by the Governor. It was further revised in 1891, on the recommendation of a commission of eight miners, three operators, two mining engineers and two inspectors, appointed by the Governor; and in 1901 Article II, of the Act of 1891, was further amended. The act of 1885 was much more satisfactory than the act of 1870, or the act of 1891, or the amendment of 1901, as its provisions were fair to the miners, operators and inspectors.

During the years 1889 and 1890 considerable dissatisfaction was manifested regarding the inspectors, especially in Schuylkill county, and this feeling was intensified against one of them who, from mistaken judgment, committed an act that, while not a violation of the law, was repugnant to the miners. It was an act entirely outside of his duties as inspector. This antagonistic feeling against the inspectors was encouraged and kept alive to such an extent by a few interested persons that the miners finally assembled in convention and passed resolutions calling upon the Legislature to amend the mining law so that the anthracite inspectors could be elected by the people. They believed that this would do away with all objectionable inspectors and remove all causes of complaint, and that it would also open an avenue for ambitious miners to become inspectors. The fact is, however, that the office of inspector has always been open to all miners qualified to fill it; but in all the years from 1870 to 1903, only one miner passed a successful examination before an examining board in the anthracite region. (The word 'miner' as used here means a man actually employed at cutting coal.) The reason for this is found in the fact that the operators have always advanced the most intelligent miners to be foremen and fire-bosses, and many of them have become superintendents and general managers of large corporations. One of them has recently attained the presidency of one of the most prominent coal companies. It is from this class of miners who were foremen or superintendents that the anthracite inspectors have generally been selected, after a rigid competitive examination before a board composed of three miners and two mining engineers. With but one or two exceptions, the anthracite inspectors from 1870 to 1900 have been men of good moral character and practically and theoretically proficient. All the anthracite laws have favored the miners in the formation of examining boards, as they have always had three-fifths of the membership of each board. They have therefore been able to control the action of the boards, and if at any time a man was chosen for the office of inspector who was not thoroughly qualified, the responsibility can be placed upon the miners.

In compliance with the demands of the miners, the Legislature in 1901 amended Article II of the law of 1891, providing, that after a certain date, all inspectors should be elected by the people under the general election law of the State, after first having passed an examination and answered 90 per cent of the questions propounded. The election of mine inspectors by the people is unheard of in any other State of the Union, except Kansas, or in any other country of the world, so far as I know. It is a most pernicious practice, as it brings the applicant for an office created for the preservation of life and prosperity into the vortex of political intrigue, and I sincerely hope the time will soon come when both the miners and operators will demand the repeal of this law. If, however, the election of inspectors is to continue, they should, at least, be elected by the miners and operators, who are the people directly interested in the office. More than this, the miners and operators of each district should vote for their own inspector. For instance, the Fifth and Ninth districts of Luzerne county are about 60 miles apart, and the residents and miners are nearly all strangers to one another. Why should the voters of the Ninth district vote for the inspector of the Fifth, when the majority of the miners in the former district are ignorant of the qualifications necessary in the inspector of the Fifth? The reasons are equally good why the voters of the Fifth district should not vote for the inspector of the Ninth. It may be presumed that the inspector of the Ninth district has satisfied the miners and operators of his district, and if so, why should the voters of the Fifth district have a right to vote against him and possibly elect his opponent, regardless of the wishes of the people of his district?

If the election of inspectors can in any way be justified, it still remains a fact that the present method is unfair to all persons whose interests are concerned. Although Article II was amended in 1901, through a defect or an omission in its provisions, only one election of inspectors has been held up to the present time. That election, however, indicated clearly how future elections would be conducted. The candidates for election in 1902 traversed the counties and used the same methods to obtain votes that were used by the other aspirants to political office. In large counties like Luzerne, Lackawanna and Schuylkill, they spent the best part of two months canvassing for the election, and if they had held the office at the time, it is unnecessary to say that the work of inspection would have been utterly neglected during that period. Can the State afford to pay wages to inspectors while they are electioneering, and consequently neglecting their duties? How will the miners regard it? The method is unquestionably opposed to the best interests of the State, the miners and the operators. The voters of the cities of Scranton, Wilkes-Barre and Pottsville, if they choose to do so, can decide who the inspectors shall be in Lackawanna, Luzerne and Schuylkill counties, while possibly not more than 20 per cent of them are mine workers. Again, why should the large farming districts of these counties have a vote as to who shall inspect the mines? The voters in both these instances are without interest in the matter. Why should the court of Schuylkill county be empowered to appoint a board to examine applicants for mine inspector in Northumberland, Columbia and Dauphin counties (Article II, Section 3), when, if a vacancy occurs in Northumberland county, it can be filled only by the court of that county (Article II, Section 13)?

Great dissatisfaction necessarily exists with

this law, particularly among the inspectors, and seven of the most competent ones (the equals of any in the world) have resigned from their positions since 1902. Under the old law, only two resigned from 1870 to 1902, and they did so to accept very lucrative positions.

The evil effects of the election of inspectors may reach even to the selection of mine foremen and fire-bosses. The inspector is an ex-officio member of the examining board, and there is reason to fear that in many cases a poorly qualified candidate, who possesses some political influence, may be treated with leniency, not only discreditable to the board, but inimical to the interests of the miners and operators. Incompetency in the office of mine foreman or fire-boss is a menace to the lives of the miners and the property of the operators. Upon the vigilance, care and efficiency of these officers depends largely the welfare of the mining interests, and I note with regret that during the past year certificates of qualification have been granted to men regarding whose incompetency there can be but little doubt.

The system formerly in vogue in Pennsylvania of selecting inspectors by a competitive examination was the best ever devised. In other States and in foreign countries the appointments are made by the governors or others in authority, without any test of qualifications. In some States, the office of inspector is considered a political one, and a change in the party administration generally causes a change in the inspectors. Any other system, however, is preferable to our present one, which we deem the worst extant, and if we are not to return to the old one, let us do as the other States do, and give the governor power of appointment, even if it be without the requirement of qualification. In this connection I desire to say that the bituminous law of this State, in this respect, is entirely satisfactory. It provides that competitive examinations be held every four years by a board of five persons, appointed by the governor, three of whom shall be miners. The board reports to the governor the applicants who have answered 90 per cent of the questions, and he commissions as many inspectors as may be needed from those who have received the highest percentage. If the number of successful applicants is greater than the number of existing vacancies, the names are placed on a reserve list, and when vacancies occur the governor appoints the applicants having the highest percentages. This method could be adopted for the anthracite region.

Another injustice resulting from the amendment to Article II is the unequal distribution of the work of the inspectors, some of them having three times as much to do as others. For instance, the unfairness of including 29 collieries in the district of Northumberland county, and only seven collieries in the district of the inspector of Carbon county, will be apparent to everybody. The former district in 1903 employed 14,580 persons in and about the mines, and produced 4,927,304 tons of coal; the latter district employed 4,051 persons, and produced 1,919,662 tons. Columbia county was also made a separate district by this amendment, although it has fewer mines even than Carbon county. To the Columbia district Dauphin county has been added, but the combined area is hardly one-third as large as the Northumberland district. Under the law, the chief of the Department of Mines has no authority to send the inspector of Columbia county to inspect the mines of Dauphin county. The inspector of Columbia county is aware of this fact, but he does the work as a matter of courtesy. He would be within his rights if he refused to do it, as the law prohibits his acting in any other county than the one in which he was elected. The operators of Dauphin county might also be within their rights if they refused to have him inspect their mines.

I have endeavored to show some of the defects of the amendment in question, and in order that they might be remedied as quickly as possible, I respectfully suggest that the next session of the Legislature repeal it, and empower the chief of the Department of Mines to make an equitable division of the work among the inspectors, without regard to county lines. I also suggest that the Legislature empower the governor to appoint a commission to revise the mining laws of the State. From the present statutes, complex and intricate as they are, a law could be framed that might meet all the requirements of the anthracite and bituminous regions. The opinion used to prevail that the laws governing the bituminous mining operations need not be as stringent as those governing the anthracite region. Very few bituminous mines were thought dangerous, even as late as 1893. As a matter of fact, however, there is much more danger of serious catastrophies in the bituminous mines than in the anthracite. There are bituminous mines to-day in which the carelessness of one man might result in the destruction of hundreds of lives. My observation leads me to think that one good law, stringent but just, would best meet the interests of all concerned. The commission might be composed of two miners, one operator and one mining engineer from the bituminous region, and two miners, one operator and one mining engineer from the anthracite region, with one person to represent the governor, who shall act as chairman of the commission. The latter member should have practical and theoretical knowledge of the workings and ventilation of coal mines, but should have no financial interest in mining.

GERMAN IRON PRODUCTION.—The output of the German blast-furnaces in September, as reported by the German Iron & Steel Union, was 833,578 tons, or 18,073 tons less than in August. For the nine months ending September 30 the total production was as follows, in metric tons:

	1903.	1904.	Changes.
Foundry iron	1,340,461	1,359,345	I. 18,884
Forge iron	656,640	623,572	D. 33,068
Steel pig	554,203	459,534	D. 94,669
Bessemer pig	324,028	310,790	D. 13,238
Thomas (basic) pig	4,649,261	4,777,728	I. 128,467
Totals	7,524,593	7,530,969	I. 6,376

Steel pig includes spiegeleisen, ferro-manganese, ferro-silicon and all similar alloys.

ARTIFICIAL RUBIES.—It is reported that by the use of the oxyhydrogen flame in a specially constructed furnace, and by careful attention to certain details, artificial rubies are produced by fusion, which, in all the physical properties required for jewelry, equal the natural products. Gems of a carat or more have been made which are said to compare with the true oriental stone, not only in composition, hardness, color and brilliancy, but even in the freedom from small bubbles, and also from de-colorized streaks. The material used is pure alumina, with chromium oxide to produce the tint. Dr. A. Verneuil is authority for the statement (*Annales de Chemie et de Physique*).

THE PRODUCTION OF FINISHED IRON AND STEEL.

The valuable statistical report of Mr. James M. Swank, general manager of the American Iron & Steel Association, has just been issued. We have already published, from advance sheets, most of the important items of production, including pig iron and steel ingots. The additional information now made public relates chiefly to the production of iron and steel in finished form.

The total production of rails in the United States in 1903 was the largest ever reported, amounting to 2,992,477 tons, an increase of 44,544 tons over 1902. Of these rails, over 98 per cent, or 2,946,756 tons, were made from bessemer steel, which continues to be the chief material used in rails. There were 45,054 tons made from open-hearth steel, a larger quantity of this material than was ever before reported. Nearly all these rails were of basic steel, from the Ensley plant, of the Tennessee Coal, Iron & Railroad Company, in Alabama. Only 667 tons of rails were made of iron in 1903, and all of these were light rails, weighing less than 45 lb. per yard.

The production of iron and steel structural shapes—not including plates or girders made from plates—amounted to 1,095,813 tons, showing a decrease of 204,513 tons from the previous year.

The production of wire-rods last year amounted to 1,503,455 long tons, of which all but 30 tons were made of steel. The total shows a decrease of 70,838 tons from 1902.

The production of wire nails, all of steel, was 9,631,661 kegs, a decrease of 1,350,585 kegs, or over 12 per cent, from the preceding year. The production of cut nails and spikes was 1,435,893 kegs, of 100 lb., a decrease of 197,869 kegs from the preceding year. The extent to which steel wire nails have taken the place of cut nails is shown by the fact that in 1886, 93.1 per cent of all the nails made in the United States were cut nails; in 1893 this proportion had decreased to 37.4 per cent; in 1898 it was only 17.5 per cent, while in 1903 it was 12.9 per cent of the total.

The production of plates and sheets, including both iron and steel, but not including nail plates, was 2,599,665 tons, a decrease of 65,744 tons from 1902. These figures include the production of black plates, or sheets for tinning, which amounted to 490,652 tons, an increase of 124,909 tons over 1902. Black plates and rails are the only items of finished production showing an increase last year.

The following table shows the production of all rolled iron and steel in finished forms, the figures being in gross tons:

	1902.	1903.	Changes.
Iron and steel rails	2,947,933	2,992,477	I. 44,544
Plates and sheets	2,665,409	2,599,665	D. 65,744
Wire-rods	1,574,293	1,503,455	D. 70,838
Cut nails	72,936	64,102	D. 8,834
Bars, hoops, shapes, and all other forms	6,683,545	6,047,998	D. 635,574
Total	13,944,116	13,207,697	D. 736,419

The figures given above include all iron and steel rolled into finished form. They do not include forged armor plates, hammered axles and other forgings, nor do they include such intermediate rolled form as muck bars, billets, tin-plate bars, sheet bars and the like.

The production of tin-plates and terne-plates in 1903, which has to be partially estimated, was 480,000 tons, an increase of 120,000 tons over 1902. The tin-plate production in this country first began in 1891, when only 999 tons were reported, while in 1894 the quantity had in-

creased to 74,260 tons. In the following year it passed 100,000 tons for the first time, and in 1898 had again increased to 326,915 tons. The further advance of nearly 50 per cent was shown last year.

The following table shows the production of finished rolled products, both iron and steel, for 12 years past:

1888	4,617,349	1896	5,515,841
1889	5,236,928	1897	7,001,728
1890	6,022,875	1898	8,513,370
1891	5,390,963	1899	10,294,419
1892	6,165,814	1900	9,487,443
1893	4,975,685	1901	12,349,327
1894	4,642,211	1902	13,944,116
1895	6,189,574	1903	13,207,697

The production of iron blooms and billets has almost entirely ceased. Last year there were 9,940 tons of iron blooms produced in forges from pig iron and scrap, but no blooms were made direct from the ore. In fact, iron blooms, except for a very few special uses, have been entirely superseded by bessemer and open-hearth steel.

WORKING TITANIFEROUS IRON ORES IN INDIA.

According to a writer in the London *Colliery Guardian*, the iron ores smelted in the native furnaces, by the process which may still be seen in operation at the present day and has been described by various observers during the nineteenth century, are generally of the friable ochreous kinds. Many instances are quoted in the *Records and Memoirs* of the Geological Survey in which furnaces erected in the immediate neighborhood of rich beds of massive hematite and magnetite are fed with nodules laboriously gathered over a vast extent of land, either from the lateritic soil, or amongst sandstone beds of Gondwana age. That a better class of ores has been worked in former times is made evident by the existence of ancient mines, such as those situated in the Dhar forest and elsewhere, excavated through compact silicious hematites and magnetites which would be refractory to the present native method of treatment. An interesting instance of this sort was brought to notice by Mr. Holland during a recent visit to Kishengarh, in Rajputana, the ore being a highly ferriferous ilmenite. The mineral occurs abundantly in large, well-shaped crystals, associated with quartz and largely crystalline clear calcite, in a broad vein which traverses granitoid gneiss, and is situated one mile east by a little north of Kanchria, a village three miles south of Kishengahr. There are remains of excavations made at an unknown period, in which a few cupriferous stains forming thin films on some of the vein minerals lend apparent support to a tradition according to which these excavations represent an abandoned copper mine. Heaps of slag occur in the immediate neighborhood. Chemical analysis shows that the slag is undoubtedly an iron one, and the presence in it of a small amount of copper and a large proportion of titanium clearly indicates its connection with the mineral of the neighboring vein. In spite of its refractory nature, the titaniferous iron ore must have been smelted, no doubt on account of the high class of the metal obtained. The copper is present in the slag only as an impurity, and appears to occur in very small amount as a constituent of the mineral vein. The large and well-shaped crystals of titaniferous iron ore form aggregates in which individual crystals measure 2 in. or 3 in. diameter. Their specific gravity is 4.60. They are strongly magnetic. They are steel gray, with a sub-metallic luster. The streak is brownish. Qualitative chemical tests reveal the presence of ferric iron in great abundance, with a considerable, though smaller, amount of the ferrous oxide. Titanium is abundant. Magnesia, manganese, nickel and copper are absent. There is a trace of lime. Specimens of the crystals are exhibited in the mineral collection of the Calcutta Museum.

COAL IN ALASKA.

Near Cape Lisburne, which is on the Arctic coast of Alaska, 300 miles north of the Arctic Circle, are two coal-bearing formations of economic importance. They were studied during the past summer by Mr. Arthur J. Collier, of the United States Geological Survey, who, assisted by Mr. Chester Washburn, made his way in an open dory as far east as Cape Beaufort.

Of the two coal-bearing formations, one, which lies east of Cape Lisburne, is of Jurassic or Lower Cretaceous age, and the other, which lies south of Cape Lisburne, is either Lower Carboniferous or Devonian. The Mesozoic coal-bearing formation, which has been known for the last three-quarters of a century, commences at a point 25 miles east of Cape Lisburne and is continuously exposed along the coast to Cape Beaufort, a distance of 40 miles. It contains the Corwin and Thetis mines, the location of which has been shown on many recent maps of Alaska.

Geologic study shows that the coal measures of these fields have a total thickness of at least 15,000 ft. and contain not less than 40 beds of coal, each over a foot thick. The aggregate thickness of all the beds seen by Mr. Collier is over 150 ft. Eleven of them are more than 4 ft. thick and contain coal of good quality. Analysis of samples from some of the beds shows the product to be low-grade bituminous coal. A limited amount of coal has been mined here since 1879 for whalers and revenue cutters. Several cargoes were mined in 1901 and sold at Nome markets for $18 and $20 a ton, in competition with Comax and Washington coal at $25 a ton.

None of the coal-beds has been permanently developed. The coal produced was mined from the croppings along the sea cliff and boated off to the ships through the surf. There is no harbor for vessels nor protection from any but south winds. In 1903 a small amount of coal, probably not exceeding 20 or 30 tons, was produced at the Corwin mine. In 1904 about 20 tons were taken by the steamship *Corwin*, and about 10 more tons were mined for consumption at the Point Hope whaling station.

The Paleozoic coals outcrop at three points along the coast, 4, 8 and 12 miles, respectively, south of Cape Lisburne. The coal-bearing formation extends southward for a distance of about 40 miles, and reaches the coast again at Cape Thompson. Beds over 4 ft. in thickness occur at each of the localities noted. No analysis of these coals has yet been made. They are bituminous and of considerably better grade than the Mesozoic coals of the region. They are totally undeveloped, but in 1903 a few tons were mined from croppings in the sea cliffs and used at the Point Hope whaling station.

ASPHALT IN THE CAUCASUS.—Russian papers report the discovery of asphalt beds near the town of Sukhum, in the Caucasus. The mineral is said to be of excellent quality.

SOME ILLINOIS COAL STATISTICS.

The Illinois coal report for 1903 shows that during the fiscal year ending June 30 the total coal mined in the State was 34,955,400 tons, an increase of 4,934,100 tons over the previous year. The report divides the operating mines into two classes—shipping, or commercial, mines, and small mines, which are worked only for local trade. The number of each class, with their production, was as follows:

	No.	Tons mined.	Average.
Commercial mines	353	33,676,537	95,401
Small mines	580	1,278,863	2,205
Total	**933**	**34,955,400**	**37,498**

Thus the commercial mines, or larger operations, furnished 96.5 per cent of all the coal mined. The disposition of the coal mined is reported as follows:

	Tons	Per ct.
Sold and shipped from mines	30,084,387	86.1
Supplied to locomotives at mines	1,117,243	3.2
Sold to local trade	2,316,814	6.6
Used, or wasted, at mines	1,436,956	4.1
Total	**34,955,400**	**100.0**

The measure used in Illinois is entirely the short ton, of 2,000 lb. The percentage of coal used at the mines is rather lower than in Pennsylvania and Ohio bituminous mines, and much lower than in the anthracite mines. This is partly accounted for by the number of small mines in which steam power is not used, or is used only to a very small extent. Reports from such mines, also, are not exact, as a rule.

Another statement shows the form in which the coal was used and the average value per ton at the mines:

	Tons.	Per ct.	Value.
Run-of-mine	10,373,098	29.6	$1.00
Lump	15,874,509	45.4	1.35
Egg	995,163	2.8	1.27
Nut	1,755,714	5.1	0.95
Pea	4,540,421	13.0	0.53
Slack	1,416,495	4.1	0.32
Total	**34,955,400**	**100.0**	**$1.05**

Last year coal-cutting machines were in use in 68 mines, a total of 522 machines being employed. The coal mined by machine was 7,646,777 tons, or 21.9 per cent of the total. The average wage paid for machine mining was 43.4c. per ton; for hand, or pick, mining, 56.4c. per ton. The average coal mined per employee per year, including all workers inside and outside, was 701.7 tons; per employee per day, 3.67 tons.

Miscellaneous statistics show that the average days worked at commercial mines was 222; at all mines, 191. The lower average for all mines is due to the fact that many of the small mines are operated only in winter, when there is a local demand for the output. There were 810,861 kegs of powder used, of which 806,344 were used in blasting, showing an average of 43.3 tons mined to a keg of powder.

The number of employees reported and the number of accidents are given in the following table:

	Underground.	Surface.	Total.
Miners	34,904	.....	34,904
Other employees	8,523	5,111	13,634
Boys	1,276	.....	1,276
Total	44,703	5,111	49,814
Number killed by accident			156
Number injured by accident			410
Total casualties			566
Killed per 1,000 employees			3.13
Injured per 1,000 employees			8.23
Total casualties per 1,000			11.36

The injured include only those who were hurt so badly as to lose a month's time, or more. An analysis of the accidents and their causes will be given in another article.

COAL MINING IN ASTURIAS, SPAIN.*

BY HENRY LOUIS.

The province of Asturias is in the extreme north center of Spain, facing on the Bay of Biscay. The coal mines are the most important in Spain, with an annual output of 1,500,000 tons. The mine selected for description is near the village of Polo de Laviana, on the northern flanks of the Cantabrian mountains, and in the valley of the river Nalon. The coal is taken by the Langrero railroad to Gijon, the natural port of the region.

A concession or 'royalty' here covers about 2,300 ft. on the strike, and the same distance across it. The concession to be described has two seams, but only one is worked; this pinches down to 1 ft. and widens to 4 ft., but averages about 3 ft., and dips 30 to 35° to the northwest. The floor is of strong fire-clay; but the roof is of shale, which occasionally and

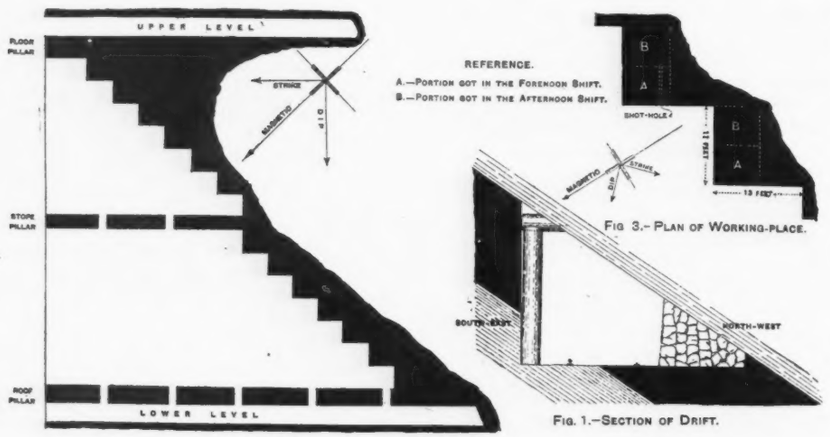


FIG. 2.—PLAN.

FIG. 3.—PLAN OF WORKING-PLACE.

FIG. 1.—SECTION OF DRIFT.

COAL MINING IN THE ASTURIAS.

treacherously breaks away from the overlying sandstone.

The methods of working are rather more primitive than those in use in some of the larger collieries. Five level drifts are run into the hillside, separated about 200 ft. along the seam and 100 ft. apart vertically, the lower levels being worked first. The drifts are run close under the roof shale, the stone cut down on the high side being used to build a rough pack on the lower side of the drift. In good ground single props are enough. (See Fig. 1.) In bad ground, a set of two legs and a cap is used. Small inclined upcast ventilating shafts, about 330 ft. apart, together with the levels, block out the seam into horizontal pillars or slices about 200 ft. wide along the dip. Raises are put up from each level, and the face thus formed is attacked by a method of working which may be described as intermediate between longwall and overhand stoping. This is shown diagrammatically in Fig. 2.

The hewing and blasting of the coal, as arranged for forenoon and afternoon shifts, is shown in Fig. 3.

The slope of the seam is just too flat for the coal to slide down alone, and it is, therefore, shoveled by boys. Externally between drifts there are short, self-acting inclines, and there is a ropeway to carry the product to a washery on the river Nalon. The coarse grade lumps (*grueso*), rejected by a grizzly, make 40 per cent. That passing through is washed by hand in strakes and screened into smalls (*menudo*), making 30 per cent, and nut (*galleta*), making 20 per cent. The slime which is lost is rated at 10 per cent. The average cost of coal at the railroad in lump is 24 pesetas, or $3.84; nut, $3.68; smalls, or slack, a little less.

In a neighboring colliery, the slime is coked by burning in rectangular beds 70 ft. long by 15 ft. wide by 7 ft. high. The result is a rather poor coke from a strongly coking coal. The output of the mine is from 50 to 70 tons per day.

Only natural ventilation is used, which, though feeble, is sufficient. The levels are damp, but the working faces are comparatively dry. No gas has ever been noticed. Naked lamps of the universal Spanish pattern are used, and they are fed with olive oil.

Wages are rated, by the piece, at about 72c. per day, and most of the handling of the coal is performed by manual labor. The original paper is particularly valuable in details of mining the coal, details which can hardly be reported here in full.

*Abstract from *Proceedings* of the Institution of Mining Engineers, Newcastle-on-Tyne, England.

COAL FOR THE SPANISH NAVY.—From a recent governmental order in Spain the use of all foreign coal in the State marine service is prohibited. The intention is to develop home resources, and the act seems to have been taken from loyal motives, even if, for a time, a poorer quality must be used.

ELECTRIC WELDING OF A CYLINDER.—A paper was read some time ago before the Dresdner Bezirksverein by Herr Meng, in which is given an interesting account of the electrical welding of a cylinder of a 1,000-h. p. engine. The cylinder is 1,250 mm. diameter, and is the low-pressure cylinder of a compound engine. A crack 700 mm. long was noticed, and it was decided to treat it by Slavianoff's method of welding and casting, and apparently the treatment was successful. But a second crack developed, about 530 mm. long and parallel to the first. On the preliminary heating up to close this crack the original crack opened; so it was decided to heat them through over the entire thickness of the material—40 mm.—and the parts were welded in 4½ hours in twelve sections. The result is quite satisfactory, and the total cost was under $250, while a new cylinder would have cost about $2,000 in all.

BOOKS REVIEWED.

Mining in British Columbia. Bulletin No. 19. Prepared by the Bureau of Mines. Victoria, B. C.; Public Printer. Pages, 176; illustrated.

This is one of a series of reports on the natural resources and progress of British Columbia which are published from time to time by the government of that province. While it is based, to some extent, on previous editions, the information has been brought up to date, and chapters have been added on the smelting industry and on the Crow's Nest Pass coalfields. Besides the general statistical information, there are a number of notes on the different mining districts and the coalfields. In addition to the chapter on smelting, there are notes on the water powers in use, and on some which may be utilized hereafter. There is also a summary of Mr. Garde's paper on the possibilities of zinc mining in the Province, which has already been published in this JOURNAL. The volume is attractively printed and is illustrated by a number of views of mines and smelting works.

The Baraboo Iron-Bearing District of Wisconsin. Bulletin XIII, Wisconsin Geological and Natural History Survey. By Samuel Weidman. Madison, Wis.; published by the State. Pages, 200; with maps and illustrations.

The discovery of iron ore deposits in iron-bearing formations of pre-Cambrian age in the quartzite ranges of the Baraboo district, in Central Wisconsin, drew immediate attention to the region. A remarkable point was that the discovery was made in a flourishing agricultural district, which had been settled for many years. Moreover, the iron-bearing strata nowhere outcrop, or appear at the surface, but are buried beneath sandstone and drift, so that exploration must depend entirely upon the drill, and not upon superficial indications, or ordinary prospecting. The Wisconsin Geological Survey had previously done some work on the Baraboo quartzites, papers referring to them having been published in several of its reports. After the discovery of iron ore, a new examination was undertaken, to discover the association of this iron-bearing formation with the outcropping quartzite; to locate the various formations of the district, and to secure other information, which might not only solve some interesting questions, but also serve as indications for further exploration. The results of this work are presented in the present monograph, which gives a connected account of the geology of the region.

Some account of the Baraboo iron range was given by Oscar Rohn in the JOURNAL for September 24, 1903. Dr. Weidman's work is, of course, more elaborate and complete, as it contains the results of the latest explorations, made during the past year, while it is also not limited to the space of a single article.

Dr. Weidman's conclusions as to the origin of the ores are "that the iron ore of the Baraboo district was originally a deposit of ferric hydrate, or limonite, formed in comparatively shallow, stagnant water, under conditions similar to those existing where bog, or lake, ores are being formed to-day; and that, through subsequent changes long after the iron was deposited as limonite, while the formation was deeply buried below the surface and subjected to heat and pressure, the original limonite

became, to a large extent, de-hydrated and changed to hematite. It is not believed that the Baraboo iron ore was necessarily formed as a lake, or bog deposit; but that conditions were similar to those in which such deposits are formed. These are the presence of shallow, quiet water, containing in solution considerable iron, derived from the surface weathering of iron-bearing rocks of adjacent land areas, in which organisms could readily thrive. Under these conditions, by action of living, dead and decaying organisms, assisted perhaps to some extent by chemical precipitation, there were built up, it is believed, the ferruginous deposits, with which are intercalated a variable amount of the clay of purely mechanical origin."

Regarding the relation of this district to the iron ranges of northern Wisconsin, Michigan and Minnesota, the conclusions reached are stated as follows: "On the whole, the definite correlation of the Baraboo series with the series of the Lake Superior pre-Cambrian districts must be left undecided. The Baraboo quartzite has been considered heretofore as of probable Upper Huronian age, although its relations to the older and younger formations associated with it have never been determined. If the Huronian system, instead of consisting of two series of Upper and Lower Huronian, really consists of three unconformable sedimentary series, which may be tentatively referred to as the Upper, Middle and Lower Huronian, as our present knowledge seems to indicate, then it seems to the writer that the Baraboo series is, with little doubt, either Middle or Upper Huronian, and more probably the former than the latter."

English and American Steam Carriages and Traction Engines. By William Fletcher. London, New York and Bombay; Longmans, Green & Company. Pages, 428; illustrated. Price, $5, net.

It is a fact little known that the steam carriage for common roads considerably antedated the railroad. To say nothing of such early experiments as those of Cugnot, Symington and Evans, as long ago as 1788-1790 Fourness in England, and Nathan Read in this country, built practicable steam carriages. In 1824-1830 several such vehicles were built and successfully run in England; but the introduction of the railroad, and popular prejudice against the use of any motive power but horses on the common roads, put an end to their use for the time. About 1858-1860, Mr. Fisher, an artist of New York, built a steam carriage which had many points of resemblance in design to the modern touring automobile; but lack of money and failure to interest others in his plans forced him to abandon it. His car worked successfully, though he had not the advantage of liquid fuel, or of materials adapted to light construction of engines, which are possessed by the designers of the present day.

The present book may be divided into two parts, the first dealing with steam carriages for passenger and pleasure service, the second with road locomotives and traction engines. The first three chapters are historical entirely. They are followed by two, treating rather briefly of modern steam carriages and automobiles. The remaining seven chapters are devoted to traction engines and road locomotives. Mr. Fletcher evidently believes that the traction engine is of far greater utility than the automobile.

BOOKS RECEIVED.

In sending books for notices will publishers, for their own sake and for that of book buyers, give the retail price? These notices do not supersede review in a subsequent issue of this JOURNAL.

The Art of Wise Investing. New York; the Moody Publishing Company. Pages, 94.

Indiana, Report of the State Inspector of Mines. James Epperson, Inspector. Indianapolis; State Printer. Pages, 100.

The Architects' Directory and Specification Index for 1905. Sixth Year. New York; William T. Comstock. Pages, 152. Price, $2.

Notes Generales sur L'Agglomeration de la Houille. Madrid, Spain; reprinted from the *Revista Minera.* Pamphlet, 10 pages; illustrated.

St. Lawrence River Power Company Plant at Massena, N. Y. New York; Prepared and issued by the Company. Pages, 60; illustrated.

Twenty-second Annual Coal Report of the Illinois Bureau of Labor Statistics, 1903. David Ross, Secretary. Springfield, Ill.; State Printers. Pages, 464.

Metallurgical Practice in the Black Hills of South Dakota. By Charles H. Fulton. Rapid City, S. Dak.; published by the School of Mines. Pages, 64; illustrated.

Die Erzlagerstätten. Part 1. By A. W. Stelzner. Revised by Alfred Bergeat. Leipzig, Germany; Arthur Felix. Pages, 488; illustrated. Price (in New York), $4.50.

Manual of Modern Surveying Instruments and Their Uses. Eighth Edition. San Francisco; Prepared and issued by the A. Lietz Company. Pages, 212; illustrated. Price, 50 cents.

Exhibit of the Bureau of Labor at the Louisiana Purchase Exposition. Carroll D. Wright, Commissioner. Washington; Government Printing Office. Pages, 1484; illustrated.

The Colliery Managers' Handbook. Fifth Edition. By Caleb Pamely. New York; the D. Van Nostrand Company. London; Crosby Lockwood & Son. Pages, 1208; illustrated. Price, $10.

A Short Review of Mining Operations in the State of South Australia for the Half-year ended June 30, 1904. T. Duffield, Secretary for Mines. Adelaide, S. A.; Government Printer, Pages, 12.

American Water Works Association. Proceedings of the Twenty-fourth Annual Meeting, 1904. John M. Diven, Secretary. Elmira, N. Y.; published for the Association. Pages, 588; illustrated.

Grundzüge der Siderologie. Dritter Theil. Die Hüttenmännischen Prozesse. By Hanns Freiherr von Jüptner. Leipzig, Germany. Arthur Felix. Pages, 276; illustrated. Price (in New York), $3.25.

The Electrical Transmission of Energy. Fourth Edition. By Arthur Vaughan Abbott. New York; the D. Van Nostrand Company. London; Crosby Lockwood & Son. Pages, 676; illustrated. Price, $5, net.

Electric Lighting. Volume I. The Generating Plant. Sixth Edition. By Francis B. Crocker. New York; the D. Van Nostrand Company. London; E. & F. N. Spon, Ltd. Pages, 492; illustrated. Price, $3.

CORRESPONDENCE.

We invite correspondence upon matters of interest to the industries of mining and metallurgy. Communications should invariably be accompanied with the name and address of the writer. Initials only will be published when so requested.

Letters should be addressed to the Editor.

We do not hold ourselves responsible for the opinions expressed by correspondents.

Coal Mine Accidents.

Sir—I read with interest your notes on accidents in the anthracite region in the latest issue of the JOURNAL. It seems to me that the information as to the proportion of accidents would be better if you could give the proportion to 1,000 days' work, as well as that to 1,000 employees. Thus from the figures you give in the JOURNAL, I find that the average time the collieries were worked was 211 days last year. This would give an approximate total of 32,035,497 days worked; and ratios of 0.016 killed and 0.041 injured; or a total of 0.057 casualties per 1,000 days' work.

Of course, I anticipate one objection you will make to this—that is, the total number of days is not correct. It assumes that all the men in each colliery worked every day that it was open. This is certainly not the case. Probably it would be impossible—at least, it would require too much labor and expense—to ascertain the actual number of days worked. We must be content with general averages and approximations. Even then I think that the days' work average would bring us down closer to facts than the ratio to number of employees which you give.

It is certainly to be regretted that, while the casualties in British mines are decreasing, those in Pennsylvania should be growing more numerous. Thus, I see by your statement that the ratio of deaths per 1,000 employees was higher in 1903 than in any year since 1881, with the exception of 1891 and 1901—which is not progress in the right direction.

I am quite aware that blame may be attached to the employees themselves. It is not easy to control a heterogeneous mass of different nationalities and languages, and to educate them in the ways of carefulness. It is probably true also that discipline is not so good since the strike. But some fault may be in managers also, and in policies which are just a little too economical. Mr. Roderick's remarks on falls of roof, which you quote, are very good. They seem to indicate that more care is needed, and that some extra precautions would not be out of place. Unfortunately, there seems to be no consideration of anything beyond expense. The saving of human life, or even the lower motive of pride in a low accident rate, do not come into the question at all.

OBSERVER.

New York, Nov. 12, 1904.

The Passing of the Forge.

Sir—In looking over the report of the American Iron & Steel Association, just issued, I find recorded the practical end of a process of iron-making first introduced into this country a century and a half ago, which flourished for many years. In New York, New Jersey, Pennsylvania and Maryland there were, in the early days, many forges making blooms and bar iron direct from the ore, with the use of charcoal, and generally by the aid of water-power. In New Jersey especially, near the iron mines of Morris and Sussex counties, these forges were scattered over the country, wher-

ever there was water-power sufficient to run the trip-hammer and furnish blast. They were picturesque, and they made good iron, too—some of it of a quality hard to get in these days. Of course, they could not make iron on a large scale, nor could they turn it out so cheaply as is done by the intensive modern methods. The blast-furnace, improved methods of puddling, and finally the introduction of the bessemer and open-hearth processes of making steel, put the Catalan forge out of competition altogether. But an old-timer may be pardoned some sentimental regret at the disappearance of a method of iron-making which he watched and studied with deep interest as a boy.

The last of the New Jersey forges operated was the Riggs forge, at Stockholm, which turned out blooms that were sold to the Navy Department for making anchors. It ran up to 1889, or thereabouts. At the same time Milton forge, in Morris county, was standing in fair order, but not in use. I give the date from memory, and someone may be able to correct me.

A forge in North Carolina—Helton forge, in Ashe county—ran up to 1897, but is now abandoned. The very last survivor of the many Catalan forges in the United States, which did such good work in their time, is Standish forge, in Clinton county, in the Adirondack region in New York. This ran on Chateaugay ore, and is owned by the Chateaugay Ore & Iron Company. It is still standing, but did its last work in 1901, and will never be started up again, in all probability.

The day of the forge has finally passed, but it deserves at least a passing notice for what it has been.

IRON-MASTER.

Netcong, N. J., Nov. 12, 1904.

ABSTRACTS OF OFFICIAL REPORTS.

El Oro Mining & Railway Company, Ltd.

The mines and works of this well-known company, capitalized at £1,150,000 authorized, of which £1,080,000 have been issued, are situated in El Oro mining district, State of Mexico, and about 100 miles northwest of the City of Mexico. The report of the general manager, Mr. R. M. Raymond, for the fiscal year ending June 30, 1904, indicates a continuance of the prosperity which has attended the businesslike management of this great enterprise.

The profit and loss account showed a mining expenditure of £163,448, and a total expenditure of £349,799. To balance this, there was received: By bullion recovered, £293,137; railway receipts, £51,525; interest, exchange, etc., £5,137; total, £349,799. The assets in the way of railway and mining equipment, stores on hand and in transit, etc., amounted to £1,176,320. The earnings for the year were as follows: Balance carried over, £69,568; gross profits, £146,072; total, £215,640. This amount was appropriated as follows: Dividends No. 8 and 9, £81,000; capital expenditure written off property account, £109,500; experiments on tailing, £10,195; income tax provision, £11,383; reserve for bad debts, £1,840; balance carried forward, £1,722; total, £215,640.

The total sum distributed in dividends since the formation of the company—including dividend No. 9, declared on June 27, 1904—amounts to £545,000, or, in round figures, about one-half as much as the capitalization issued.

The mining operations for the year were vigorously pushed, and showed a total length of workings opened of 13,182 ft., or, roughly, 2.5 miles of development. From this and older workings there were taken out 109,288 tons, of which 106,921 tons were treated at the mill.

The average gross value of this ore was $16.65 per ton, United States currency, distributed between $14.54 in gold and $2.11 in silver. Of this value, $2.22 in gold and $0.05 in silver per ton was extracted in the stamp mill, and $9.89 in gold and $0.83 in silver was extracted in the cyanide mill. This gives a total extraction per ton of 83.36 per cent of the gold and 41.71 per cent of the silver. This means that the tailing carried off a value of $2.43 in gold and $1.23 in silver, a tenor which is considerably above the average of the original Treadwell ore, for instance.

In view of the proposed use of the Butters' process for tailing, which will be applied in the new mill (No. 2), it will be interesting to watch future extraction, which may reasonably be expected to show better results. Experiments in cyaniding alone showed the results to be inferior to the combination of amalgamation and cyanidation.

The total cost of handling the ore is $6.85 per ton. This is distributed as follows: Mining proper, $1.78; mine development, $1.08; milling, $1.19; cyaniding, $1.25; all general expenses, $1.55.

The mine development shows 561,073 tons of ore in sight. It would be interesting to know exactly the total cost required per ton of ore, both to develop and also to stope and bring it to the surface. Perhaps it is allowable to obtain this by adding the cost of $1.78 for mining ore already developed to the $1.08, the cost of developing ore to be mined later. This gives $2.86 as actual total expense of mining. But to this should be added a pro rata part of the general office expenses, $1.55. If we take a third of this as belonging properly to mining, it brings the cost per ton of ore mined up to about $3.37, which is only a fair figure.

The construction was relatively heavy. This included work in the new mill foundation, a new hoist and new crushers, the Butters' experimental plant, a pumping plant at the Mortero dam, new cottages, etc. The separate account of the railway, which operates in connection with the mine and mill a line some 35 miles long, proves a source of revenue. The gross receipts were $486,442; the gross expenses were $357,791, which left a net profit of $128,651, to which must be added a net profit from the lumber and wood account of $32,061.

During the year the directors have entered into an agreement with the Mexican Light & Power Company, Ltd., whereby it is expected that cheap power will be obtained early in the coming year.

In the official report there is given some detail of the work on the various shafts, levels, drifts and stopes; but there are no illustrations beyond a plain general ground plan of the mining properties, and a small longitudinal section of the "branch vein." The ore reserve blocked out is estimated at 561,073 tons, an increase of 17,183 over last year.

COAL IN TASMANIA.—The Mines Department of Tasmania reports that, for the quarter ending June 30, the output of coal was 15,783 tons, as compared with 11,873 tons for the previous quarter.

QUESTIONS AND ANSWERS.

Queries should relate to matters within our special province, such as mining, metallurgy, chemistry, geology, etc. Preference will be given to topics which seem to be of interest to others besides the inquirer. We cannot give professional advice, which should be obtained from a consulting expert, nor can we give advice about mining companies or mining stock. Brief replies to questions will be welcomed from correspondents. While names will not be published, all inquirers must send their names and addresses. Preference will, of course, always be given to questions submitted by subscribers.

Molybdenite.—You will do me a favor if you will kindly let me know what kind of mineral the enclosed specimen is through the columns of the JOURNAL.—F. E.

Answer.—The specimen sent is a good sample of molybdenite. The specimen is very small, but its nature is unmistakable.

Cost of Making Litharge.—What is the approximate cost of converting lead into litharge in Mexico?—C. D.

Answer.—Under conditions similar to those you mention, the cost would be $1.50 to $2 per ton of litharge. At the Harrison smelter, at the Cerralvo, in Nuevo Leon, 100 bars of lead bullion, equivalent to 5 tons, are cupelled in 24 hours, employing 4 men, at 75c. apiece, and 2 to 3 cords of wood, at $1.80 per cord.

Solvent for Silver Sulphate.—In studying out a new commercial process in which the solution of fairly large quantities of sulphate of silver plays an important part, I have found that every one of the solvents generally known presents some inconvenience for the attainment of my object. I have tried sulphuric acid, cyanides, sodium sulphide, alkaline hyposulphites, ammonia. Besides those above mentioned, do you know of any solvent for the sulphate of silver that would work at a maximum temperature of 100° C., but preferably at a less one?—Experimenter.

Answer.—Of course, you have not forgotten the virtue of hot water as it is practiced in the time-honored Ziervogel process. Water at ordinary temperature dissolves silver sulphate to the extent of one part in 200; and boiling water (100° C.) dissolves it to the extent of one part in 70 or thereabouts. The practical value of this solubility is very much greater than one would believe if he had not seen the water method in practical operation; and, while there is still a large neglected field of experimentation on the solubilities of the silver salts, yet the limitations in economy enforced by the low price of silver, and the advantages offered gratis by water, would seem to urge that the simplest, the most obvious and the most abundant be given the preference. Among the possibilities that you do not mention are also the double chlorides, the substituted ammonias, the double sulphates and the like. Again, the list you have given includes many modifications, conditions and combinations. The problem, as you have stated it, is rather general, for in answering it one has no statement as to the character of the ore, the incidental contamination, or the chemicals available in your immediate locality. However, it can be assumed that every such problem is capable of a solution which will give a practical yes or no, provided one will exhaust the possibilities. Unfortunately, the hydro-metallurgy of silver represents a belated chapter in the history of metallurgy.

RECENT DECISIONS AFFECTING THE MINING INDUSTRY.

SPECIALLY REPORTED.

PERFORMANCE OF COVENANTS VALIDATES UNRECORDED LEASE.—Where a lease was entered into between a land owner and an oil producer for the purpose of enabling the latter to follow his occupation on the premises and produce oil and gas from same, the oil producer had a right to explore for oil, and when he discovered it the contract would endure for such time as was necessary to accomplish the purpose of the contract, and the agreement was not invalid, because no time was mentioned. Where such lessee, by the performance of his contract obligations, acquired an interest in the premises, his title became valid and subsisting by assignment, without filing of same, though the law requires leases and assignments of land to be recorded, and the lessee had a right of action to restrain a third person from interfering with the premises.—Tucker vs. Watts (25 *Ohio Circuit Court Reports,* 320); Circuit Court of Ohio.

LEASE TERMINABLE FOR DELAY WHEN FRAUDULENTLY PROCURED.—In an action to cancel a lease of land for oil and gas development, the fact that the lessor executed an agreement with the lessee providing for delay does not deprive the lessor of his right to forfeit such lease for failure to prosecute the work with diligence and good faith, where it appears that the purpose of the lessee was fraudulent; the lessor not being aware of such purpose at the time he executed the lease. In such action it was pertinent to show the amount of oil land under lease by such lessor and his efforts to procure other tracts. Though such lease be silent as to the extent of development required, the law implies a condition for diligence, good faith and reasonable development.—J. M. Guffey Petroleum Company vs. Oliver (79 *Southwestern Reporter,* 884); Court of Civil Appeals of Texas.

DEVELOPMENT MUST BE WITHIN REASONABLE TIME.—By a written contract, one party gave another the right to mine, sell and transport all the oil and gas underlying his land, but no time was fixed for the beginning of operations, nor for the completion of a well, and no express provision that a well should ever be drilled; but it was agreed that a sum should be paid annually by the second party till oil or gas was found, or till, in the judgment of the second party, they could not be found. If they were found, the first party was to receive a share. The court held that there was an implied engagement by the second party to explore for oil and gas, which, if not performed in a reasonable time, entitled the first party to a forfeiture. A payment of the amount provided for delay and acceptance by lessor was a waiver by the latter of performance for that year.—Consumers' Gas Trust Company vs. Littler (70 *Northeastern Reporter,* 363); Supreme Court of Indiana.

DUTY ON THERMIT.—The merchandise in question is a newly invented article called 'thermit,' used for welding purposes. Duty was assessed in one instance at the rate of 25 per cent as a chemical compound, and in the others at the rate of 45 per cent, under the provisions of paragraph 193 of the act of July 24, 1897, as "articles . . . composed wholly or in part of . . . metal," and the importer claims alternatively that it is dutiable properly at the rate of $4 per ton, under paragraph 122, or 20 per cent ad valorem, under paragraph 183, or at 25 per cent ad valorem, under paragraph 3, or at a specific rate, under paragraph 135, or at 6c. per pound, under paragraph 185, or 10 per cent or 20 per cent ad valorem, under section 6 of said act.

The testimony of Dr. Hans Goldschmidt, the inventor and manufacturer of thermit, shows that it is a mechanical mixture consisting of four parts of powdered aluminum and one part of powdered oxide of iron; that the aluminum metal is purchased by him in lump form, and the oxide of iron in the form in which it comes from rolling mills as a by-product; that he reduces the aluminum and oxide of iron to powder, and then mixes them together by hand in the proportions already stated, and that the aluminum is the component material of chief value. There is no resultant chemical change from the mixing—the aluminum still is a metal and the oxide of iron is unchanged.

We are of the opinion that the assessment of duty at the rate of 45 per cent was correct. The article is composed wholly or in part of aluminum, and it falls precisely within the terms of paragraph 193, the pertinent provision of which is as follows: "Articles or wares not specially provided for in this act, composed wholly or in part of . . . aluminum or other metal. . . ."

The protests are overruled and the decision of the collector will stand.—Appeal of F. Behrend from Collector of Customs at New York; Board of General Appraisers.

PATENTS RELATING TO MINING AND METALLURGY.

UNITED STATES.

The following is a list of patents relating to mining and metallurgy and kindred subjects, issued by the United States Patent Office. A copy of the specifications of any of these will be mailed by THE ENGINEERING AND MINING JOURNAL upon the receipt of 25 cents. In ordering specifications correspondents are requested to name the issue of the JOURNAL in which notice of the patent appeared.

Week Ending November 8, 1904.

774,156. COMPOSITION OF MATTER.—Ludwik Champowich, New Britain, Conn. A composition comprising a mixture of 66 parts sulphur, 9 parts black lead and 4 parts sand intermixed with iron.

774,166. MULE OR PUSHER CAR.—Eric Esselius, Steubenville, Ohio, assignor to the Wellman-Seaver-Morgan Company, Cleveland, Ohio. A mule or pusher car, comprising a frame mounted on wheels, of a pusher-bar projecting in advance of the car and pivoted at its rear end below the frame near the rear end of the latter, and elastically held in position.

774,167. DIRECT CASTING AND HARDENING OF METAL FOR ARMOR-PLATE, ETC.—Willis E. Everette, Tacoma, Wash. A method of direct casting and hardening of metal for armor-plate and other articles, which consists in melting a charge of metal or metallic ore by a flux, consisting of the cyanide of an alkali, and injecting into the molten mass, a quantity of molten cyanide of an alkali, mixed with from 1 to 10 per cent of pulverized sulphide of molybdenum, from 0.5 to 5 per cent of metallic manganese, from 1 to 10 per cent of chromium and from 0.5 to 5 per cent of aluminum, and drawing off and cooling the molten mass by a spray of liquid carbonic acid.

774,207. GAS-SCRUBBER.—Alfred Steinbart, Carlstadt, N. J. The combination with a vessel, of a spraying-nozzle in the top of said vessel, circular deflector-plates in the top of said vessel only placed on edge for converting the spray from said nozzle into a vertically falling rain, and means for conducting gas through said vessel.

774,212. TESTING-MACHINE.—William J. Tretch, Philadelphia, Pa., assignor to Frederick A. Riehle, Philadelphia, Pa. In a testing-machine, a shot-receptacle having an emission-aperture, means within said receptacle for closing said aperture, a stationary portion below said receptacle and means rising from said stationary portion and normally disengaged from said closing means but adapted to engage with said closing means to positively hold the same when the shot-receptacle is moved upward by reason of the breaking of a specimen.

774,230. ELECTROLYTIC APPARATUS.—Arthur Brichaux, Brussels, Belgium, assignor to the Solvay Process Company, Syracuse, N. Y.—An electrolytic apparatus comprising a receptacle for receiving the electrolyte and electrodes, separated partitions supported within the receptacle between opposite walls thereof and having their outer faces separated from the inner faces of said opposite walls and their lower edges arranged above the bottom of the receptacle, and additional separated partitions supported within the receptacle between the first partitions and having their outer faces separated from the adjacent faces of the first partitions and their lower edges arranged above the lower edges of said first partitions.

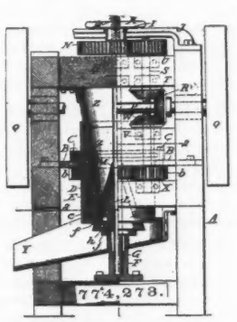
774,232. FURNACE.—Albert C. Calkins, Los Angeles, Cal. A furnace provided with a muffle-chamber and with a flue and air-passage, a muffle in said chamber in communication with said flue and a removable plug to close the end of the muffle and said passage in one position and to uncover the same when withdrawn.

774,256. CONVEYER.—Nicholas H. Larry, Champaign, Ill. The combination with a conveyer, of a feeder, means for actuating the same, by said conveyer, means for moving grain on said feeder to said conveyer, said feeder being adjustable horizontally over the path of said conveyer.

774,261. RETORT.—John C. Mallonee, Charlotte, N. C., assignor of one-half to John Jefferson Mallonee, Crichton, Ala. The combination, with the retort and means for suspending it independently of the brick-work, of an arch sprung over the retort and angle or flanged irons secured to the retort and bearing against the sides of the arch to support the latter in place against the contraction and expansion of the retort.

774,269. MINER'S SQUIB.—Edward C. Owens, Pricburg, Pa. A blank for miner's squibs, consisting of a strip of paper having unequally tapered edges at one end of the same, whereby said strip may be rolled into a tube having a tapering end, slits formed in and arranged at an acute angle to one edge of the strip, and means whereby the tapered end of said blank may be unrolled and rolled again without disturbing the tubular end of the same.

774,273. ORE-GRINDING MILL.—Cyrus C. Pratt. Portland, Oreg., assignor of two-thirds to John E. Mayo, Martin L. Pratt, and Mark Weddell, Portland, Oreg. An ore-grinding mill comprising a main frame having an apertured crown-bar, a bearing-block on the lower portion of the frame, a horizontally disposed annular plate fixed in the frame at an intermediate

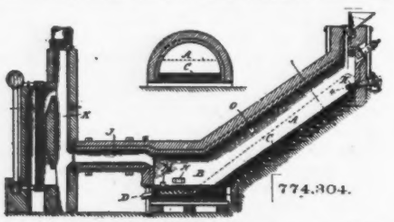


point in the height thereof, an annular collar connected to the plate and having an interior groove, a cylinder having an exterior rib disposed in the groove of the collar, and also having interior vertical grooves, a shell arranged in the cylinder and having vertical ribs disposed in the grooves thereof; said shell being interiorly tapered from its upper end to a point adjacent to its lower end and gradually enlarged and smooth from said point to its lower end, an upright shaft journaled and movable vertically in the crown-bar of the frame and the bearing-block and having a threaded upper end, a hand-screw fixed on said end above the crown-bar, a cone fixed on the shaft and

having vertical grooves, a mantle mounted on the cone and having its ribs disposed in the grooves thereof, and also having a smooth surface opposed to that at the lower end of the shell, a shaft journaled in the main frame and provided with flywheels, a driving connection intermediate of the said shaft and the cylinder, and a driving connection intermediate of the shaft and the cone.

774,287. BLOOM-SHEARS.—Clarence L. Taylor, Alliance, Ohio, assignor to the Morgan Engineering Company, Alliance, Ohio. In bloom-shears, the combination with a frame, a movable cross-head carrying the lower cutter, and an upper movable cross-head carrying the upper cutter, of a cylinder and plunger carried by the upper cross-head and tie-rods connecting said plunger and lower cross-head.

774,304. METALLURGICAL PROCESS.—Martin P. Boss, San Francisco, Cal. A method of producing steel direct from iron ore, which consists in subjecting



774,304.

the ore to the reducing action of a hydrocarbon-flame, and at the same time to the combining action of a hydrocarbon vapor.

774,311. MANUFACTURE OF LAP-WELD-PIPES.—Rufus C. Crawford, and George Baehr, McKeesport, Pa., assignors to National Tube Company, Pittsburg, Pa. A method of making lap-weld-tubing, which consists in charging in succession a series of bent-up skelp into a furnace onto one zone of the hearth thereof, raising their edges to a welding heat, passing them in succession through welding-rolls and over a mandrel, then while still at a high heat recharging the tubes in succession onto another zone of the same hearth and reheating the same, and then giving them in succession a second pass through welding-rolls and over a mandrel, whereby a continuous double-welding process is carried on.

774,330. COKE-QUENCHING AND BLEACHING APPARATUS.—Edwin A. Moore, Philadelphia, Pa. A receptacle for hot coke, in combination with a trench for containing water, means for supplying water from the trench to the receptacle, and means for returning water from the receptacle to the trench.

774,337. METHOD OF MAKING LAP-WELD-TUBING.—Peter Patterson, McKeesport, Pa., assignor to National Tube Company, Pittsburg, Pa. A method of making lap-weld-tubing, which consists in charging in succession a series of bent-up skelp into a furnace on one side of the hearth thereof, gradually moving the same over toward the center of the furnace, withdrawing the same in succession from the furnace and passing them through welding-rolls and over a mandrel, recharging them in succession into the same furnace and on the opposite side of the hearth thereof, again gradually moving the same over toward the center of the furnace, and again withdrawing the same in succession from the furnace and giving them a second pass through welding-rolls and over a mandrel.

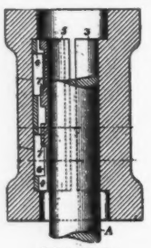
774,341. RECORDING-CALORIMETER FOR GAS.—Frank N. Speller, McKeesport, Pa. In a device for measuring the heating value of gases, the combination of a combustion-chamber, gas and air inlets thereto, means for maintaining constant pressure in said combustion-chamber at all temperatures therein, and means for measuring the temperature in said chamber

774,349. PROCESS OF FILTERING SLIMES.—Henry R. Cassel, New York, N. Y. A process of filtering slimes, which consists in filtering off the liquid from the pulp by suction in a tank containing filter-cells, and simultaneously agitating the pulp between the cells.

774,376. TUBE-LIFTING DEVICE FOR CONVEYING-TROUGHS.—John J. Boax, McKeesport, Pa., assignor to National Tube Company, Pittsburg, Pa. In a conveying-trough for tube and like mills, the combination of a trough, a lifting-finger pivoted on one side and near the upper edge thereof and lying transversely in the bottom of the trough, and power mechanism projecting through the trough and arranged to engage said finger and lift the same.

774,387. HOISTING APPARATUS FOR BLAST-FURNACES.—Harry Heffrin, Pittsburg, Pa., assignor to Thomas H. Martin, trustee, Pittsburg, Pa. A hoisting mechanism for blast-furnaces having in combination a skipway, a constant-speed motor, a car movable along the skipway, and means for moving said car operated by said motor and having a slower speed as the car approaches the ends of its travel than between intermediate points.

774,398. STAMP-STEM AND TAPPET ATTACHMENT.—William Reine, Quartz Mountain, Cal. A device for securing tappets to stamp-stems, comprising fixed and movable segments within the tappet and each embracing substantially one-half of the circum-



774,398.

ference of the stamp-stem, a shoe substantially inclosing and conforming to the movable segment and fitting a chamber within the tappet and movable with relation to one of the segments, said segment and shoe being tapered in opposite directions and adapted to lock the segments upon the stamp-stem.

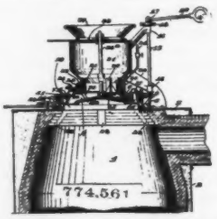
774,423. LUSTROUS COMPOSITION.—Joseph Heineman, New York, N. Y. A lustrous composition, consisting of aluminum (finely powdered and chemically pure), transparent varnish and sulphur.

774,430. GAS-MANUFACTURING APPARATUS.—Charles R. Ingham, Suffern, N. Y. In gas apparatus, the combination of a furnace, a steam-superheating retort consisting of a plurality of pipes of small diameter connected together and situated entirely within said furnace and filled loosely with fragmentary refractory material so as to afford a single continuous long narrow tortuous conduit within the furnace of practically uniform area in cross-section throughout, for the passage of steam introduced under pressure into the retort, a mixer, having means for forcing the gas generated therein to work back against the pressure of the incoming steam and hydrocarbon before escaping from the mixer, means for introducing a supply of hydrocarbon into said mixer, means for causing the superheated steam from the said retort to impinge upon the hydrocarbon introduced into the mixer, and means for drawing off the resultant gas from the mixer.

774,476. CONVEYER.—David E. Hughes, San Diego, Cal. In a conveyer having means to feed cylindrical objects one by one from the lower table to the carrying cross-arms; cross-arms rigidly mounted on the cross supporting-beam, the cross-arms being mounted on and above the cross-beam, the said cross-arms being spaced apart to permit of their passage between the projecting ends of the upper table and the supporting cross-beam to pass below the ends, in combination with the upper table having projecting members positioned thereon to permit the cross-arms to pass between said projecting members of the upper table and deposit their load on the upper table.

774,560. CONVEYER.—Gabriel Carlson, Springfield, Mass. A conveyer-belt consisting of two parallel edge strips of flexible material, and separate parallel wires extending from one strip to the other to constitute the supporting surface of the conveyer, and means to secure the ends of the wires to said strips in separated relation to hold them against lateral or endwise displacement.

774,561. CHARGER FOR GAS-PRODUCERS.—Elbert H. Carroll, Worcester, Mass., assignor to Morgan Construction Company, Worcester, Mass. A fuel-feed



774,561.

for gas-producers consisting of a stationary top plate, a fuel-supply reservoir and a rotary feed-casting interposed between the two, and provided with an opening eccentric to its axis of rotation through which the fuel drops from the reservoir onto the top plate, and from which it is swept by the movement of the feed-casting.

774,571. MACHINE FOR MOLDING ARTIFICIAL STONE.—George W. Dy Arman, Indianapolis, Ind., assignor of one-half to John Whitaker, Columbus, Ohio. A molding-machine including a mold-bottom, a vertically swinging mold-front, a pair of mold ends mounted slidingly on the mold-bottom, and a mold-back attached to the mold-ends.

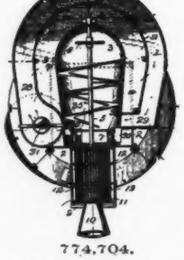
774,590. BLAST-CHARGER.—James Lord, West Terre Haute, Ind. An implement for charging blast-holes, comprising a tube, a plunger-disk in the tube, a plunger-rod in the plunger-disk, and a locking means on the rod to hold the plunger-disk at the outer end of the tube.

774,591. FURNACE FOR REDUCING AND SMELTING NICKEL OXIDES.—Robert R. Maffett, Bayonne, N. J., assignor to International Nickel Company. A furnace having an open-hearth smelting-chamber, an elongated reducing-chamber leading therefrom, charging-openings for said reducing-chamber arranged lengthwise thereof, a flue extending beneath the reducing-chamber, and a stack-flue with which the reducing-chamber and flue communicate at their rear ends.

774,655. SAFETY DEVICE FOR MINE-SHAFTS.—Norval W. Dickerson, Derwent, Ohio. The combination of an elevator-shaft, an elevator-car movable in the shaft and provided with rails, a landing provided with rails arranged to register with those of the elevator-car, a horizontally movable lever fulcrumed at an intermediate point of its length alongside one of the rails on the landing, and having a forward arm for preventing the passage of a car when the elevator-car is away from the landing, and a rear arm for preventing the passage of a car when the elevator-car is at the landing, means for normally holding the lever so that its forward arm rests in the path of a car on the landing-rails, a rock-shaft journaled in a suitable bearing and having arms at its ends; one of said arms being arranged to be engaged by the elevator, a longitudinally disposed lever fulcrumed at an intermediate point of its length on the landing, a bar connecting the other arm of the rock-shaft and the forward arm of the said lever, and a bar connecting the said lever and the first-mentioned lever.

774,682. ARTIFICIAL FUEL AND METHOD OF MAKING SAME.—Michael F. Maginnis, Philadelphia, Pa. An artificial fuel composed of 2,000 lb. bituminous coal finely powdered, 40 lb. of anthracite coal ashes finely sieved, 120 lb. of salt and 70 lb. of water together with 20 lb. of meal, the residue of linseed-oil.

774,704. ORE WASHING MACHINE.—Gustave Seberg, Racine, Wis. A machine for washing and disintegrating ore, comprising a suitable receptacle having an extension upon one end thereof, a receiving and agitating drum mounted within the latter receptacle; an inclined, spiral sluiceway extending from the receptacle; a chamber located at the lower end of said



774,704.

sluiceway, a stand-pipe extending from said chamber upward to the top of the machine; an elevating-shaft having suitable elevating devices comprising a worm secured near the bottom and top of said shaft and agitating-blades at the lower end thereof, located in said stand-pipe in combination with agitating devices in the receptacles whereby when said receptacles, sluiceway, chamber and stand-pipe are filled with water the lifting devices within the stand-pipe will induce a continuous circulation of water through said parts.

774,705. MANUFACTURE OF ARTIFICIAL FUEL. James J. Shedlock, Little Bentley, England. A process for the manufacture of artificial fuel from a mixture of coal and tar, which consists in subjecting said mixture in detail to the action of highly-heated inert aeriform fluids or fluids in a gas-tight vessel and recovering by distillation the volatile constituents which are vaporized by said heat.

SPECIAL CORRESPONDENCE

San Francisco. Nov. 9.

It is understood that the famous Natoma vineyard of 4,000 acres, near Folsom, Sacramento county, has again changed hands, to be utilized for dredge mining purposes. It was bonded some time since to R. G. Hanford, for Armour & Co., who were to install dredges at once, the bond price at that time being reported as $800,000. The price was considered too high by the Armours, and the bond remained in the name of Mr. Hanford. If the current reports here are correct, he has now disposed of the tract to the Guggenheims for $2,000,000. This is the largest single tract of dredging land yet sold in this State. There is an immense vineyard covering the ground, which has been in full bearing for many years, but the vines will now be destroyed by the operation of the dredges. The tract borders the American river just below Folsom, between that place and Sacramento. There is mining ground all along that section, but most of it was worked out many years ago by the old methods. Since dredge mining has proved so successful in other places in California, the deposits of gravel along the American river have received attention, and several tracts have been purchased and a few dredgers set at work. Tests of the ground of the Natoma vineyard proved it to be of much greater value for mining than for vineyard purposes—hence this sale. Above Folsom considerable drift mining has been going on for several years, and in several instances large sums of gold have been taken out. The channel, however, is somewhat irregular, and some of the companies have quit work, while others are making but little. The drift mining, however, is much more expensive than when dredgers are used, and dredgers are preferred where it is not too deep to bed rock. Further up the river than the Natoma vineyard a number of ranches have been bonded for dredging purposes, and tests are being made. The tract mentioned is, however, the largest yet acquired for this purpose.

R. B. Harper has begun suit against John Joyce and W. B. Holloway and the San Juan Quicksilver Mining Co., of Santa Clara county, for an accounting and dissolution of partnership. He avers that certain mineral lands were conveyed to Joyce and Holloway for their joint benefit with himself, and subsequently the named company was organized to work these lands. He avers also that he was the original discoverer of the mines, and subsequently managed and worked them for the company. He asserts that the first-named defendants still hold the titles to the properties in their own names, but are about to transfer them to the company, and that both the individuals and the company refuse to give him his one-third share. He asks for an accounting; for dissolution of partnership; a conveyance of one-third interest to himself, and the appointment of a receiver pending determination of the action. The mines are near San José.

Since the cutting down of the attorneys' fees in the long-drawn-out litigation over the Golden Cross mine, owned by the Free Gold Mining Co., of Hedges, San Diego county, it looks as if the end of the receivership was close at hand. The court has ordered the receiver to pay the reduced fees to the attorneys and then turn the property over to a board of managers selected with the consent of all parties concerned. This board consists of D. M. Delmas, T. S. Fuller, Jefferson Chandler, Isaac Trumbo and W. V. Hedges. The Golden Cross is one of the largest low-grade propositions in the State, but there is a very large mill on the property, together with an extensive cyanide plant, and were the property free from litigation and resultant lawyers' and receivers' fees, it would doubtless be again quite profitable. For some years it has been in the courts, and, notwithstanding all the drawbacks, has managed to "pull out" and pay its debts.

It seems odd to find the old Comstock mining companies, whose names have been familiar to the public for so many years, now being incorporated again. However, such is the fact, the object of the reorganization being to separate the Comstock and Brunswick lode interests, so that none of the companies will have to work both lodes. The name Brunswick designates the companies which will operate on that lode. The capital stock has been increased in some instances. The value of each share is fixed at $10 for the Comstock companies, and $5 for the Brunswick companies. The names of companies and their capital stock under the reorganization are as follows:

Savage Gold & Silver Mining Co., $1,120,000; Mexican Mining Co., $1,008,000; Brunswick-Potosi Mining Co., $336,000; Union Consolidated Mining Co., $1,000,000; Brunswick-Chollar Mining Co., $336,000; Sierra Nevada Mining Co., $1,000,000; Chollar Gold & Silver Mining Co., $1,120,000. Each company has five directors, each of the following-named men being on the directorate of more than one of the companies: C. Hirshfeld, Herman Zadig, W. T. Baggett, B. F. Shaw, William Bannan, George C. Sneider, Nat T. Messer, Charles H. Fish, E. P. Barrett, A. T. Coffin, J. W. Twiggs.

The independent oil producers operated at Kern river to the number of 35, and representing a monthly production of 600,000 barrels, have perfected an organization. The contracts provide for the control of the product by the association, which will market the product, but the property titles remain as they are. The new corporation is called the Independent Oil Producers' Agency, and the following officers have been elected: President, M. V. McQuigg, Monterey; first vice-president, Timothy Spellacy, Bakersfield; second vice-president, F. F. Weed, San Francisco; treasurer, W. B. Robb, Bakersfield; secretary, A. H. Liscomb, Bakersfield; auditing committee, W. H. Hill, T. O. Turner, J. Benson Wrenn, all of Bakersfield. The following are directors: T. Spellacy, W. B. Robb, A. H. Liscomb, W. S. Morton, W. W. Stephenson, C. H. Ritchie, L. P. St. Clair, Jr., S. P. Wible, W. H. Hill, G. J. Planz, Lesser Hirshfeld, W. A. Ferguson, E. E. Jones, C. C. Bowles, J. F. Lucey, J. B. Batz, T. C. Turner, C. A. Barlow, H. A. Jastro, J. Benson Wrenn, W. D. Young, T. V. Doub, L. E. Doan, E. Dinkelspiel, Bakersfield; T. Earley, James F. Ker, Pasadena; F. F. Weed, L. Woodbury, E. Denicke, George W. Lane, San Francisco; A. J. Wallace, Los Angeles; M. V. McQuigg, Monterey; Thomas M. Gardner, F. P. Fuller, Oakland; F. N. Schofield, Kern.

The company will at once proceed with the business of marketing oil. This company is the result of the Standard Oil and associated oil companies trying to control the output of the Kern river field and keeping down the price of oil to 12½ cents per barrel. It is expected that the new independent agency will benefit the smaller class of producers.

CHAS. G. YALE.

Denver. Nov. 12.

The election of Alva Adams, the democratic candidate, as governor, and at the same time the election of all the other republican State officers, shows that a good deal of personal feeling existed against Governor Peabody. It is understood that a contest will be instituted on account of frauds alleged to have been committed.

Judge Marshall, of the United States Court, has made permanent the injunction against the Citizens' Alliance and the Mine Owners' Association of Cripple Creek in the matter of deportation of employees of the Interstate Mercantile Co. and interference with its business. The company is preparing the necessary papers in a damage suit against these organizations.

The Colorado creditors have won the controversy in the Telluride mill suits, and they have been transferred from the New York to the Colorado courts on the application of the attorneys of the General Metals Co. to Judge Holt of the New York court. This company operates in Colorado City.

More than $600,000, covering the pay-rolls for the month of October in the mines, sampling works and mills, was distributed this week in the Cripple Creek district.

Anaconda, one of the mining towns of the district, has been destroyed by fire. Several large buildings on adjacent mining property, as the Mary McKinney and the Anaconda, had a narrow escape, but were saved.

Nearly 6,000 tons of ore, consisting to a large extent of concentrate, were shipped from Central City to the smelters in the valley during October, and the low rates for shipments over the Colorado & Southern and for treatment charges by the smelters will undoubtedly assist in the moving of large amounts of ore. The Golden plant is now operating in full blast. During the past month about 5,000 tons of ore and concentrate were shipped from Idaho Springs. In the case of that camp, also, the increase of shipments of late is caused by low railroad rates and a low schedule of smelting charges, caused by the competition of the Golden smelter of the Independent Smelting & Refining Company.

The Colorado & Northwestern and Colorado & Southern railroads, connecting at Boulder, have just issued a joint tariff for ore shipments to the Denver smelters, which will result in a considerable saving in cost of the transportation of ores.

It is rumored that at the next meeting of the stockholders of the Denver, Northwestern & Pacific railroad, more familiarly known as the Moffat line, some new directors will be elected, among whom will be prominent men connected with transcontinental systems. Both the Rock Island system and the Burlington system are mentioned in this connection. There is no doubt but that in time this new line will become the western connection of one of the large systems, and it will, as its building advances, develop a large, virtually unexplored empire in western Colorado and eastern Utah.

The eight-hour day has been granted to the five big mines of the Telluride region. The plants concerned are the Smuggler Union, Liberty Bell, Tomboy, Nellie and Alta. It was the demand for this concession in the mills of the State that precipitated the strike in the mills and mines of Colorado and caused the bitter strife between unionists and mine owners in the Telluride and Cripple Creek regions. The minimum wage promised under the new arrangements is $3 a day.

Salt Lake City. Nov. 12.

The Queen mill, operated by the Butterfield Mining Co. at Bingham, is running on about 40 tons of ore a day. In the mine a large tonnage of low grade silver-lead-gold ore is blocked out.

The new 60-ton mill at the Stockton mine, at Stockton, was started up on November 12, with the crushing department and a portion of the other equipment in operation. Ground was broken for the plant just 60 days ago. The electrical equipment is not quite all installed, but will be, probably within the next two weeks.

The long tunnel which is to connect the new milling plant at Newhouse, Beaver county, with the 600-ft. level of the Cactus mine is nearing completion. Less than 400 ft. of work is required to make the connection complete. With three shifts working from both ends, rapid progress is being made. The adit will be finished by the time the new concentrating plant is ready for the ores, all of which will pass through it. Electric motors will be used in the movement of the mine cars within the tunnel. The ore will pass through a set of crushers at the mouth of the tunnel on coming from the mine. From the ore bins here, the product will be transported over a standard gauge railway to the mill, about two miles below.

The United States Mining Co. is reported to have earned during the month of October about $50,000 net. This is an increase over September, which is due to a greater tonnage of custom ores being handled than usual. A better grade of copper ore from the Centennial-Eureka, one of the company's mines, was also brought in to the smelter.

The directors of the Uncle Sam Consolidated Mining Co. decided to pass the November dividend. It is uncertain when another one will be posted, as the board has decided upon an extensive campaign of development, which includes the driving of a 2,000-ft. cross-cut for the purpose of opening up an extension of the May Day vein.

The new orebody opened up on the 900-ft. level of the Honerine mine, at Stockton, is

proving up well, and the indications are that it is the largest shoot ever opened in the mine. Assays show from 40 to 42 per cent lead and about 22 oz. silver to the ton.

The Bryan group, at Alta, has been bonded to W. J. Craig, superintendent of the Yampa mine, at Bingham, and others.

A 12-ft. vein of good galena ore has been opened up in the Little Pittsburg mine, at the head of American river.

During the week ending November 11, ore and bullion settlements, as reported by Salt Lake banks, aggregated $430,000; $178,600 for ore and concentrate, $230,400 for base bullion, and $21,000 for gold bullion.

The Utah Consolidated smelter produced 308,319 lb. of copper bullion during the week ending November 11. The United States Smelting Co. produced 252,780 lb. during the same period.

Houghton. Nov. 12.

Mr. H. F. Fay, president of the Miskwabik, has telegraphed Capt. James Chynoweth to start exploration as soon as possible. It will be necessary to equip the property with a larger hoisting engine, a heavier air-compressor and more boilers. The Miskwabik now includes the adjoining tracts owned by the Miskwabik Development Ass'n, the Federal Copper Co. and the Union Copper, Land & Mining Co., all of these organizations, whose holdings aggregate over 1,000 acres, having given options to Mr. Fay. The organization of the Miskwabik Mining Co. is contemplated, with a capitalization of 100,000 shares at a par value of $25 per share, but it will not be effected until the result of exploration warrants the extensive opening of the property. In the meanwhile, 10,000 shares in the prospective company have been sold at $2 per share and 'participation receipts' issued. This places an exploration fund of $20,000 in the hands of the management. The last of this stock was sold in Boston on Thursday, according to the telegram from Mr. Fay. When the company is organized 10,000 shares will be issued to retire the 'participation receipts,' 40,000 shares will go to the owners of the properties in exchange for quit claim deeds and 50,000 shares will be available in the treasury for sale to the public to secure money for development. It is expected that the stock will be sold at $8 a share, leaving $17 a share assessable. The holders of the 'participation receipts' will receive stock certificates in exchange for their receipts, whose paid-up value per share shall equal the price per share at which the treasury stock is sold to the public. There is a shaft down 100 ft. on the dip of the lode, which has been identified by Dr. L. L. Hubbard as the Kearsarge amygdaloid. This shaft is about 8 miles from the most northerly Mohawk shaft, which is the nearest development to the Miskwabik on the Kearsarge lode.

The Mohawk has its permanent conical-drum hoisting engine for No. 1 shaft erected, and it will be ready for service in two weeks. A duplicate of this engine is being erected for No. 2 shaft; it will be ready for service probably within two months. Both engines are housed in one building, near No. 2 shaft, and an extensive boiler-plant is nearing completion. The rock-house at No. 3 shaft, which was burned just a year ago, has been rebuilt. It has an inadequate hoisting engine, which will be replaced by the larger hoisting engine now in service at No. 1 shaft when the No. 1 permanent hoisting engine is placed in commission. No. 4 shaft is supplying its full quota of rock. It is equipped with a permanent conical-drum hoisting engine. The 60-drill air-compressor at No. 4 is supplying the entire mine, all other compressors having been put out of service. They will be retained for emergencies. No. 5 shaft is 25 ft. in the rock and continues to disclose copper rock of more than ordinary richness. Timbering will begin next week, and when the permanent hoist at No. 2 goes into service the temporary engine from that shaft will be moved to No. 5. The longest southerly drift from No. 4, approaching No. 5 shaft, is 800 ft. long, leaving 1,000 ft. to penetrate before No. 5 is reached. This drift is breasted in good copper ground.

On November 9 the Allouez encountered the Kearsarge lode by means of a diamond drill. The drill was operating from the 1,030-ft. level of No. 1 shaft, which is sinking in the hanging wall at an incline to the west of 80° from the horizontal. This shaft is now 1,200 ft. deep and will encounter the lode, which dips at an approximate incline of 42°, at a depth of 1,390 ft. A diamond drill-hole had already been driven from the bottom of the shaft, continuing at an incline of 80° from the horizontal, and had encountered the lode at a depth of 1,390 ft. The second drill-hole, which has just encountered the lode at another point, was driven in order to furnish measurements from which the exact dip of the lode may be computed. It was a horizontal hole and intersected the lode at 1,090 ft. on a vertical line from surface, about 1,600 ft. from the outcrop and 227 ft. from the drilling station. The Allouez does not own any part of the outcrop. The drill core extracted this week is extremely rich. The rock was so thoroughly charged with copper that no piece of core was secured intact to exceed 2 in. in length. The remainder came out in twisted pieces of metal, or in sludge, resembling what is known in the stamp mills as 'No. 3 mineral,' the entire amount of material taken out by the drill averaging over 50 per cent copper. The lode on the transverse line penetrated by the diamond drill is 21 ft. 6 in. from hanging wall to foot-wall. A portion of the permanent conical-drum hoisting engine has been delivered at the Allouez, and the remainder is ready for shipment in the Nordberg works at Milwaukee. Material is also arriving for the steel rock-house, which will inclose the shaft-house already erected. The rock-house will be completed and the hoist ready for service by the time the mine is developed to an extent that will permit rock shipments to the stamp-mill, probably four or five months hence. Machinery is being placed on the ground to begin work at No. 2 shaft. A pipe will be driven next week to ascertain the thickness of the overburden, and the shaft-sinking will proceed as soon thereafter as possible. This shaft will be 1,700 ft. north of No. 1 shaft. The railroad spur has been completed to the site of both shafts.

The Tamarack is now maintaining rock shipments of about the same volume as in the past. The Mammoth hoisting engine at No. 5 shaft became disabled two weeks before its duplicate, being installed there, was ready for service, and it will be laid up for repairs for some time. Therefore the new engine is only duplicating the service performed by its crippled mate, and the period for increased production has been delayed.

The Franklin has completed the installation of an engine at No. 2 shaft that is capable of furnishing rock for shipment to the mill. As a result the fourth head is now in regular service, increasing the tonnage treated about 33 per cent.

ARTHUR L. CARNAHAN.

Spokane. Nov. 10.

Prominent stockholders in the Granby Consolidated Mining, Smelting & Power Co., of Grand Forks, B. C., were in Spokane this week as the guests of Jay P. Graves, general manager. The party included J. Langeloth, a director of the Granby company and president of the American Metals Co.; G. M. Luther, a Granby director and secretary of the Nicholls Chemical Co., of New York; J. B. Herreschoff, of the Granby and the Nicholls companies, and Dr. R. De Neufville, of Berlin, a director of the Metalgesellschaft. The visitors inspected several Montana smelters on their way here.

L. E. Shields, a railroad contractor of St. Paul, recently visited Franklin camp, north of Grand Forks, B. C., whither the Kettle Valley railway is planning to build an extension, which, with a southern extension, would connect Spokane and Franklin camp. Mr. Shields says that the building of the railway from Grand Forks to Franklin camp is feasible from an engineering standpoint, at a cost of $15,000 a mile, with a grade not to exceed one and one-half per cent. James F. Hill, a Colorado smelter man, after visiting Franklin camp and noting the large surface showings, is said to be negotiating at Grand Forks to build a second smelter there to compete with the Granby plant.

Alfred McMillan, managing director of Le Roi Mining Co., at Rossland, B. C., was in the city this week. He says that the question of amalgamating Le Roi, the Center Star and the War Eagle, at Rossland, and the Snowshoe, in the Boundary district of British Columbia, is dependent upon the reports of the experts examining the properties to see what economies could be effected. Mr. McMillan who is interested in the Snowshoe as well as in Le Roi, is of the opinion that some metallurgical advantage would accrue from combining the ores from the two at the Northport, Wash., smelter. While both are silicious ores, analyses indicate that a better flowing slag would be secured from fusion. Mr. McMillan declined to discuss what would be done in case of amalgamation with the Northport smelter, owned by Le Roi, and the Rossland Power Co.'s concentrator at Trail, B. C., owned by the War Eagle-Center Star interests. It would be practically impossible to work both in conjunction. One must be abandoned—and it would hardly be the immense six-furnace Northport plant—or else Northport would handle part of the output, while the rest would be concentrated at Trail and smelted in the Canadian Pacific Smelting Works there. A. I. Goodell, manager of the Northport smelter, met Mr. McMillan here. He has changed the system at Northport by practically abandoning four furnaces, and is handling the smelter as a two-furnace plant, treating 400 tons of ore a day. Le Roi is supplying most of that, and the grade is fairly good. The ore is coming from the middle levels of the mine, chiefly from the 600 and 700-ft. workings. Development at the 1,300-ft. level has not disclosed ore to justify optimistic predictions expressed six months ago.

Reports from the Continental mine, near Porthill, Ida., owned by the Idaho-Continental Mining Co., are encouraging. The property is employing 35 men. The three lower tunnels are being driven. The middle one has an exceptionally good showing, with eight feet of galena that concentrates three into one. The tunnel has been run 300 ft., all in ore. The face is kept eight feet wide, to permit of mining to advantage by power, and the full face shows the ore. In the tunnel on the top of the mountain, a drift to the east shows good ore. The lowest, or Blue Joe tunnel, exposed a 400-ft. ore-shoot. H. C. Kelly, formerly superintendent of the Chandler iron mine, at Ely, Minn., is in charge.

Frank Brown, manager of the Jumbo and the Crackerjack mines, in Buffalo Hump camp, has purchased a part interest in seven quartz claims in Bangard creek, 16 miles from Nome, Alaska. He is associated with Louis Dahl, who recently returned from there.

Latest advices from Thunder mountain, in central Idaho, say that the boilers for the Sunnyside mine were within 16 miles of Roosevelt. Most of the Sunnyside machinery is in, and crews are working day and night to install it. Mr. Loy, of Cripple Creek, the underground engineer of the Dewey, recently bonded 25 claims near the H. Y. and the Dakota for $125,000. Two new sawmills are cutting timber for the mines, and have made a price of $65 a thousand at the mills, as against $150 a thousand, which was the old price for whipsawed lumber. It costs $10 more to deliver the lumber in town.

The Northport smelter has contracted for three years to handle its matte at the Tacoma smelter.

A ruling of much importance to millmen is partially announced by Judge Beatty, of the federal court, in the damage suit for $546,500 brought by 21 farmers along the river against the Coeur d'Alene mine owners for having dumped tailing into the stream, which has polluted the water with lead and other metals. It is asserted that the overflow in the spring has nearly ruined the ground for farm lands on the river bottom for agricultural purposes. The defendant contended that it had established the right to the use of the water before the farmers settled upon their land. In passing upon this demurrer Judge Beatty says: "It is immaterial whether" (defendants') "rights were prior to or subsequent to plaintiffs.' In neither case would it be justified in

using its right to the water so as to destroy or depreciate others' lawful rights or pursuits." Action was delayed by the judge on the clauses in the demurrer ruling that the action is barred by the Idaho statute of limitations.

Deadwood. Nov. 13.

The importance of the Black Hills as a gold mining community is no better exemplified than in its monthly output of the precious metal. October, which was the banner month of the year, although November bids fair to rival it, showed a production of over $750,000, with the famous old Homestake credited with over half of the total. The Homestake's production is rapidly growing, occasioned not only by its slightly increased tonnage, but a betterment of values and a closer recovery. The 800-ft. vein on the 1,000-ft. level of the Ellison shaft has been cross-cut to date some 50 ft., with values averaging $8 for the entire distance. This is nearly double the value of ores now treated. It is a splendid showing, illustrating continuance and even increased value of the ore with depth—as well as proving the southeasterly extension of the lode. The following table gives the gold production of the various Black Hills mines for October, the figures in each case coming from authoritative sources:

Mine:	October Output:
Horseshoe	$54,000.00
Clover Leaf	30,000.00
Spearfish	30,000.00
Homestake	510,000.00
Wasp No. 2	12,000.00
Imperial	24,000.00
Maitland	35,000.00
Golden Reward Cyanide	27,000.00
" " Smelter Shipments	10,000.00
Miscellaneous " "	15,000.00
Dakota	10,000.00
Hidden Fortune	15,000.00
Lundberg, Dorr & Wilson	12,000.00
Black Eagle	2,500.00
Placer (Estimate)	2,000.00
Total	$788,500.00

The Horseshoe has put 10 more stamps into commission. This makes 90 now dropping in the Mogul mill, at Terry. The daily tonnage is running close to 350, and will probably be substantially increased in the near future. A new melting and refining house for treating the cyanide precipitates has just been completed, and the company now turns out gold bars with a fineness equal to any in the Hills. A combination of the acid and litharge treatment has been adopted—the precipitates, after an acid treatment, being melted with litharge, and the resulting base bullion cupelled. The slags are further treated in a small blast furnace, bringing their values down to a minimum. The company has about completed the re-equipment of the Horseshoe shaft, and will soon begin unwatering those workings. At the Hardscrabble, a fine body of ore has been uncovered just below the horizon of former workings. Its value is stated to be above $10 a ton, and is the best material now being put into the mill, with the exception of that mined at the Ben Hur. It is now costing the Horseshoe $1.32 to mill the ore, and a considerable reduction will be made when the new filter presses, now being installed, are in working order.

The Clover Leaf mine, at Roubaix, has been shut down temporarily, and in the meanwhile the company will attempt to devise and install more economical and satisfactory means and methods for handling the large flow of water that has been a hindrance to operations ever since the mine was opened. President Wibaux, who arrived here the first of the week, ordered the shut-down.

Butte. Nov. 11.

Butte district is now yielding about 14,000 tons of copper-silver ore daily, and will undoubtedly maintain this output. Amalgamated alone is extracting 10,000, United Copper, about 1,300, W. A. Clark, 1,000, Speculator, 300, and other companies and individuals, enough to make up the total. During the year ending June 1 the Boston & Montana extracted 988,866 tons, at a cost of $2.90 per ton, from which the net proceeds were $4,574,498, and the gross proceeds $12,720,281. The Anaconda mined 983,001 tons, at a cost of $3.73 per ton, the net proceeds being $1,259,875, and the gross proceeds $10,761,472. The Parrot mines yielded 165,408 tons, at a cost of $2.88 per ton, the gross proceeds being $1,270,627, and the net proceeds $233,964. The Butte & Boston mined 202,286, at a cost of $3.42 per ton; the gross proceeds from this ore were $1,576,622, and the net proceeds $96,853. The Colorado extracted 206,035 tons, at a cost of $2.55 per ton; the gross proceeds were $1,616,497, and the net proceeds $74,832. These companies constitute the Amalgamated.

It will be several months before United Copper is ready to begin extracting ore from its recent acquisition, the Lexington group. The hoisting machinery has not arrived. The gallows frame is up, and other work preliminary to the unwatering of the many miles of underground openings is in progress. The workings are 1,500 ft. deep, and the water is at a point between the 500 and 600-ft. levels. Openings between the property and the mines of the Alice and Moulton, at a depth of 700 ft., make it necessary to drain a portion of the latter. It is estimated that not less than six months will be required to drain the Lexington.

The Brooklyn Bridge company, operating at the head of Oro Fino gulch, has struck a 12-in. streak of ore on the 300-ft. level. An assay gives the rock a value of $2.80 in gold, 114 oz. in silver, 22 per cent iron, 8 per cent lead, 6 per cent copper and 1 per cent zinc. The vein is about five feet wide. The company expects to begin raising ore next week.

Samples of ore from a discovery made recently on Copper creek, Granite county, have been brought into Butte. The rock carries a good percentage of copper, but the mines are too far from a railroad point to make it marketable now. Smelter men pronounce the ore good flux.

Bisbee. Nov. 12.

The Calumet & Bisbee Development Co. has been unable to raise funds to make its second payment of $85,000 on its claims, and will probably abandon the ground and go into liquidation. The company was capitalized for $400,000, half of which was paid in two years ago. Within the past month efforts have been made to secure funds with which to go on. The development work done on the company's ground has not been especially encouraging. Calumet & Bisbee lands lie out of the Bisbee gulch and away from any probable mineral carrying contact.

Efforts are now making to secure an extension of time for payment on the bond of the claims held by Wolverine & Arizona. Mr. F. C. Fenner, one of the owners, is now at Bisbee to confer with directors of the company from Calumet. An extension will probably be given, under certain restrictions as to work. Wolverine ground shows some flattering indications, and the recent splendid developments on Pittsburg & Duluth lead to hope of success.

The extension given the Higgins Development Co. till next April will be followed by another six months' grace, it is understood, if the company undertakes work of a character satisfactory to the owners. So far the work done has been of a most cursory and unsatisfactory nature.

The Southwestern Mining & Smelting Co. has nearly completed its 250-ton stack at Benson, and will blow in during January. It is equipped with one water-jacket rectangular furnace and the necessary sampling works for treating custom ores. The furnace is well built, and is placed where it should receive large ore stocks. Already contracts have been made that insure almost continuous operation. This company built an oil smelter, but found it a failure. Experiments will be made, however, in the hope of adapting this oil smelter to use.

Parties represented by H. J. Simmons, general superintendent of El Paso & Southwestern railway, are negotiating for the Apache mine, near Hachita, a short distance east of Douglas. The property is probably an important one if properly developed.

Recent ore found in Pittsburg & Duluth has extended in several directions, until now the find seems to be one of the largest in the camp. It has an important bearing on Lake Superior & Pittsburg ground, as well as on its own.

Dawson. Nov. 8.

The Dominion government has established a new temporary office for the recording of claims on Bunty creek, to which a rush recently took place, a number of claims having been staked. The discoveries in the Tanana country have had the effect of depopulating Dawson to some extent, statistics showing that, compared with last year, the population has decreased to the number of 2,404 persons.

A new road is now being built from Barlow to the Clear Creek mines. In the past, miners in this locality have been much handicapped by the cost of getting in supplies, particularly in the summer months, when the creeks are in flood. This season, however, operations were carried on upon a fairly extensive scale, pay ore having been located on the left fork, covering a distance of about eight miles. The ground is mostly shallow.

Dawson's fuel requirements during the past year have been supplied by a local company operating mines at Coal creek, from which an output of 6,000 tons of excellent coal has been made. The company expended during the year $50,000 in permanent improvements, including new docks and coal bins, the latter having a capacity of 2,000 tons. The coal is brought in cars from the creek, a distance of 12 miles. In the old workings, which have been operated by means of an incline shaft, there are 200,000 tons of coal blocked out. During the winter a few men will be kept employed sinking a new shaft to tap a seam 200 ft. below the present workings. The shaft will be vertical and will be 250 ft. deep. The new seam is 18 ft. thick, the coal being of a harder character. About 800 tons from the new vein, near the surface, have been marketed. The new discoveries on a tributary of Rosebud creek are reported to be exceedingly promising, the ground, in the opinion of many experienced miners, being a continuation of the famous White channel. Over 30 claims in the Mellish group have been staked. So far as prospected, the ground is very shallow. The only anticipated difficulty is the distance water would be required to be brought to some of the claims. On the discovery claim, meanwhile, good prospects have been found in the shaft.

Toronto. Nov. 12.

W. G. Miller, provincial geologist, returned to Toronto this week, having been engaged for about six months in mapping the area of the cobalt silver, arsenic and nickel deposits in the Temiskaming district, discovered a year ago about five miles from Haileybury. He reports that operations on these properties this summer have been very productive, and that at least $200,000 worth of ore containing these minerals has been shipped to New York for treatment. A considerable area, embracing valuable deposits, has been acquired by a New York capitalist, who contemplates the erection of a plant for the treatment of the ore, and is arranging to acquire the ore output of other mines. The iron range in Boston township, some distance north of Haileybury, which will be tapped by the new Temiskaming & New Ontario railway, was visited by Mr. Miller and found to be similar in character to other ranges in the northern portion of the province. The government drill is at work on D. O'Connor's iron properties, some 25 miles south of Cobalt, as the new station at the cobalt and silver mines has been named.

Dr. R. W. Ells, of the Dominion geological survey, has forwarded to Ottawa a preliminary report as to the extent of the Diamond Vale, or Quilchesma, coalfield, in the Nicola valley, British Columbia. This area is situated some 46 miles south of Kamloops, and is reached by the government wagon road. Dr. Ells reports, as a result of the investigations made by R. A. Johnson and himself, that the Quilchesma coal basin comprises about 14 square miles, and that there are at least six seams of bituminous coal, and probably a seventh. It is probable that the property will shortly be developed by New York and Vancouver capitalists, as there is an assured market for the output in the places along the line of the Canadian Pacific railway.

Jules Weill and Paul Koch, French capitalists, representing the Compagnie Generale des Produits Metallurgiques de France, have been at Ottawa this week making inquiries as to the prospects for the establishment of a smelting works and steel rail plant at some point in central Canada. Their visit was prompted by the adoption of the Grand Trunk Pacific railway project, and the prospect for a large demand for steel rails, etc. They had interviews with some members of the government and with Mr. Wade, chairman of the Transcontinental Railway Commission, to ascertain the prospective demand for steel manufactures. They also made close inquiries respecting the iron ore deposits of the Ottawa valley.

The annual meeting of the shareholders of the St. Eugene Consolidated Mining Co., Ltd., was held in Toronto on November 8. The financial statement showed cash surplus of $131,956, after paying off an indebtedness of $26,000. The mines of the company had been closed for two years, owing to the low price of lead, but operations were resumed in May last, since when 50,450 tons of ore have been mined, producing 10,470 tons of concentrate. A dividend of two per cent for the quarter ending September 30 was declared. The directors, who were all re-elected, chose George Gooderham as president and Thomas G. Blackstock, vice-president and managing director.

The Sapphire corundum mine, in Peterborough county, Ontario, which has attained widespread notoriety by reason of the frauds practiced by the English promoter, E. T. Hooley, in floating the proposition in England, is to be reopened. L. A. Morrison, of Toronto, the former manager, who resigned when the exposure was made, is at the head of the new organization.

Victoria. Nov. 8.

Atlin.—Steam shovels are to be used extensively in mining in this district next season, and in addition to those already arranged for, the McKee Creek Consolidated Co. contemplate installing a steam shovel on their property in the spring.

Kamloops.—Twenty inches of good coal was encountered last week, at a depth in the shaft of 334 ft., at the Kamloops Coal Mines Co.'s mine, on Coal Hill. It is proposed to continue sinking, in the expectation of striking a larger seam. The coal is of excellent quality.

Lardeau.—It is reported that two Minnesota capitalists, both largely interested in the Triune mine, have bonded the Union Jack and other claims in the vicinity for $100,000, and propose developing the properties on an extensive scale.

Nelson.—The report of the Hall Mining & Smelting Co. for the year ending June 30th shows a substantial improvement in the condition of the company, the net profit of approximately $30,000 comparing favorably with last year's return, when a loss of $4,000 was reported. Profits are largely attributable to the successful operation of the smelter, though $4,000 was realized in royalties from the mine, which was worked by a leaseholder. It is also worthy of note that administration expenses during the year were considerably reduced. The directors state that they have benefited by the bounty on lead, but only for a portion of the period under review, as it took nearly six months after the announcement of the bounty before the silver-lead mines resumed effective work, but they anticipate a still larger tonnage for the smelter during the current year. It is stated that the war in the East has adversely affected the company, as it has been impossible to market its lead in Japan, as heretofore, and it has had to be disposed of in a less favorable market. The Juno mine, where systematic development work has been in progress for some time, is to be equipped forthwith with a 10-stamp mill and cyanide plant. The property comprises three claims on Morning mountain, and adjoins the Venus on the south. In all, the mine has been developed by about half a mile of workings.

Last month's returns from the Ymir mine show a loss of $3,295, the explanation being that expenses were unusually heavy through the continuous drought, making it necessary to use steam instead of water power. Certain changes have also been made in the method of dealing with the accounts, which unfavorably affect the figures for last month's operations.

During October silver-lead production was made from 29 mines in East and West Kootenay, shipments aggregating 1,221,501 lb. lead.

Arrangements are in progress for the resumption of operations at the Dundee mine. It is proposed to install an aerial tramway and a complete mining plant.

Slocan.—Mr. C. Fernan, who is building a zinc plant at Roseberry, has bonded the Black Jack and Old Timer claims, on Coffee creek, on both of which there is a promising showing of zinc ore. Development work on the properties has already begun. New concentrating machinery is being installed at the Cork mine, on South Fork.

Monterey. Nov. 9.

The American dynamite association, through its Mexican representative, E. C. Moxham, has signified its intention of retiring entirely from the Mexican field as soon as the new tariff goes into active force. It claims that it will then be impossible to do business. This association carries a stock in Mexico valued in the neighborhood of $500,000 gold, distributed among some 100 different depositories throughout the Republic, at points convenient to the trade, but it is hoped that it will be possible to dispose of the greater part of this before the new factory at Tinaja, State of Durango, near Torreon, becomes an active competitor. This new enterprise is behind in its production, and has no surplus and few distributing magazines, so that it will be still some time before it gets well into the field, and until that time the government does not wish to make the new duty effective.

The American-Mexican Mining and Development Co., owning Las Libres, La Roca, Tecolotes and Margarita claims, at San Lorenzo, in the Velardeña district, has broken ground for a 200-ton concentrating mill, which it hopes to have in operation by February 1, 1905. The equipment has been ordered from the Allis-Chalmers Co. for a second 100-ton smelter, to be ready by the time the mill is completed. Its No. 1 is expected to go in blast in December. On Las Libres the company has a 350-ft. tunnel and a winze 250 ft. deep, all in ore running well in copper and gold, and about 50 oz. silver. On La Roca there is a 400-ft. shaft, from which is a drift several hundred feet along the vein, also running in silver, gold and copper, and about 6 to 10 per cent lead. All of its output is at present going to the Torreon smelter. The offices and stockholders of this company are in Chicago, and, besides its holdings at Velardena, it owns a large tract adjoining the Torreon smelter, on which is contemplated the building of a 1,000-ton smelter, but the company will hold back until the development warrants such an outlay. The new 150-ton smelter of the Luster Mining Co., of Durango, has been blown in.

London. Nov. 5.

A few months ago, you quoted extensively from the report of the Mountain Copper Co., Ltd., for the year 1903, and mentioned that this company was about to commence the manufacture of sulphuric acid and of superphosphates. The arrangements for this new departure are now complete. The sulphuric acid plant and artificial manure plant are to be built near San Francisco, and the company has also bought the works and business of the San Francisco Chemical Co. As your readers are aware, this new development of the Mountain Copper Co.'s business has been attended by many worries, due to local jealousies, but these matters are now settled, and it is to be hoped that in future things will run more smoothly. The production of copper at the mine is no longer interfered with by strikes, and it is estimated that the output for 1904 will be about 10,000 tons. In January next the company will redeem £250,000 of debentures.

The Sierra Buttes Gold Mining Co., which has worked the mine of that name in California for over 30 years, has at last found a purchaser for the property. For six years or so from the start, in 1870, the mine paid well, dividends amounting in all to 150 per cent being paid. Afterwards the ore became of such low grade that profit was seldom made. The company also owned the Plumas Eureka mine, which also in its early days brought profit to the shareholders. For some years now the directors have been of opinion that the properties ought to be disposed of, as they are not suitable for a London company. Like many other mines on the Mother Lode of California, they would pay a local owner, who did all the work himself. The ore is low grade, being not more than $3 to $4 per ton, and it does not exist in large bodies. There is no doubt that the directors have pursued the correct policy, and they are to be congratulated on having found a buyer.

The Hall Mining & Smelting Co., of Nelson, B. C., has benefited considerably by the recently instituted bounty on lead produced in the Dominion. The custom work increased greatly at the beginning of the present year, and the smelters are now well occupied, and at a profit. It is noteworthy that a good deal of the lead went to Japan, though at the present time this outlet is closed. New white lead works at Montreal will afford an additional market for the products, and so avoid the necessity of shipping to the United States. The company's mine had been worked to advantage by the lessee, Mr. Davys, up to August last, and during the last 12 months of his lease he shipped 4,300 tons, averaging 21½ oz. silver and 3.66 per cent copper, chiefly from the old workings above No. 5 level. He has just made another agreement with the company to unwater the mine from the fifth to the seventh level. He is of opinion that ore exists in that section of the mine, and the company, knowing him to be a man of sagacity, is going to stand half the expense of unwatering. The business of the Hall company may not inaptly be compared with that of the Sierra Buttes, above mentioned. It is a sound business and capably managed locally. If it did not belong to an English company, with huge capital, the results obtained would be considered very satisfactory and comfortable, but as it is saddled with a nominal capital of £275,000 in ordinary shares, and £24,000 in debentures, as well as with a board of directors and a London office, the net profit for a year's working—£6,000—does not go far, and is not considered worth distributing among shareholders. As a matter of fact, the capital of the company should be written down, so as to bring the capital valuation of the mine to a reasonable figure.

Once more the directors of the Etruscan Copper Estates, Ltd., have triumphed over the common sense of their shareholders. Last week I mentioned that the board proposed to reconstruct the company, with an assessment of 4s. per £1 share, and I said that I could not believe that shareholders would submit to it. I was wrong. The resolutions were carried with only a timid opposition. As the capital of the company is £575,000, this reconstruction should bring in over £100,000, that is, if all shareholders take up their new shares. In seeking an explanation for this readiness on the part of shareholders to put up further money, I have found that the views of many shareholders are as follows: They acquired their shares, which nominally are £1 shares, at substantial premiums, paying in many cases as much as £4. Under these circumstances an extra 4s. is a comparatively negligible quantity. On the off chance of making the mine pay after all, or of maintaining the market for the shares so as to enable them to unload on somebody else, it was worth while to put up the money and keep things going. On looking up the records of the company, I find that the treasury shares were issued mostly at a big premium, some as high as £4. The vendors' shares have also been extensively sold on the Stock Exchange, and during the boom the market quotation ranged around £4. The company is also saddled with £200,000 in debentures, and, naturally, the subscription of the 4s. per ordinary share helps to safeguard the holders of these bonds. I suppose the mine will now have another life, during which history will repeat itself.

PERSONAL.

Mining and metallurgical engineers are invited to keep THE ENGINEERING AND MINING JOURNAL informed of their movements and appointments.

Mr. J. Parke Channing is in Tennessee.

Mr. Edward Hooper returned to London by the *Etruria*.

Mr. C. F. Goodwin is examining properties in Taxco, Mexico.

Mr. Laurence M. Terry, of Parral, Mexico, is visiting New York.

Mr. William Russell is examining properties in southern California.

Mr. Henry C. Callahan has returned from Australia to California.

Mr. D. A. Louis returned to England by the *Oceanic* on November 16.

Mr. R. M. Raymond has returned to El Oro after a brief holiday.

Mr. J. H. Curle sends word from the Victoria Falls, of the Zambesi.

Mr. P. L. Young has returned from Chile and will go to Mazatlan, Mexico.

Mr. Sidney Smith, of Cleveland, Ohio, is examining mines in Puebla, Mexico.

Mr. Ernest Levy has been appointed manager of Le Roi No. 2, at Rossland, B. C.

Mr. Mark L. Requa, of San Francisco, has arrived in New York from Ely, Nevada.

Mr. W. R. Scott sailed by the *Etruria* on his way from Chihuahua, Mexico, to London.

Mr. J. T. Fulton, of Salt Lake City, has returned home after several months in Mexico.

Mr. Benjamin Magnus, of the Buffalo Smelting Works, has been visiting New York.

Mr. Tasi Jakagi, a Japanese mining engineer, has been inspecting coal mines in Pennsylvania.

Mr. Arthur Llewellyn, mine manager of the Sudan Goldfields, Ltd., in Egypt, has returned to London.

Mr. J. E. Hill, Jr., manager of the Pittsburg-Alta mines, Utah, is in the East on business for the company.

Mr. H. C. Harrison, of the Harrison smelter, in Nueva Leon, Mexico, is on a visit to New York and St. Louis.

Mr. Egbert Smit, of the Engineering Company of Mexico, is inspecting properties in the State of Jalisco, Mexico.

Mr. E. A. Wiltsee, American representative of the Venture Corporation, is in San Francisco on professional business.

Mr. J. W. Duntley, president of the Chicago Pneumatic Tool Co., sailed on November 8 for a short business trip in Europe.

Mr. Andrew Carnegie has been unanimously re-elected lord rector of St. Andrew's University, at Edinburgh, Scotland.

Mr. Baylies C. Clark, of San Francisco, formerly manager and part owner of the Dolores mine, Chihuahua, is now in New York.

Mr. W. F. Robertson, provincial mineralogist of British Columbia, has returned from an inspection of the Atlin district.

Mr. A. K. Brewer, superintendent of smelter No. 2, Monterey, Mex., has returned after an extended trip in the United States.

Mr. L. P. Gladstone, of London, is to be in Mexico soon, to examine El Gallo mine, on the Balsas river, Guerrero, Mexico.

Mr. C. H. Hoyt has been appointed instructor in civil and mining engineering at the Michigan College of Mines, Houghton, Michigan.

Mr. J. P. Casey has been appointed general superintendent for the Pittsburg & Sonora Gold Mining Co. in the State of Sonora, Mexico.

Mr. D. Copeland has been appointed instructor in metallurgy and ore dressing in the Michigan College of Mines, Houghton, Michigan.

Messrs. C. F. Bowen and E. T. Hancock have been appointed instructors in geology and mineralogy at the Michigan College of Mines, Houghton, Michigan.

Mr. Murray M. Duncan, of Ishpeming, Mich., has been appointed a member of the board of control of the Michigan College of Mines, to succeed Mr. Walter Fitch.

Mr. W. Leonard Holms, formerly consulting metallurgical engineer to the Consolidated Gold Fields of South Africa, Ltd., is on a professional tour in Sonora, Mexico.

Mr. Wayne Darlington, State engineer of Idaho, has resigned, to take effect November 15. He will go to California to take the management of the Bagdad Chase Mining Co., of Stagg, California.

Mr. E. D. Grant, who for some time past has been instructor in the department of mathematics and physics of the Michigan College of Mines, has recently been made assistant professor in the same department.

Mr. R. C. Wright, who for several years has been in charge of the designs for special tools and fixtures for the Westinghouse Machine Co., has resigned to accept a similar position with the Allis-Chalmers Company.

Mr. John Telfer, former manager for the Tano Bippo Gold Mines, Ltd., and the Tarkwa Proprietary, Ltd., of West Africa, has been obliged to leave Africa on account of ill health, and will make southern California his domicile.

Mr. I. Davidov has resigned from the management of the Santa Barbara Gold Placer Co., Bramley Gold Placer Co., Bertha Gold Mining Co., Santa Margarita Gold Mining Co., and Fortuna Gold Placer Co., operating in Colombia, S. A., and has no further connection with these companies.

ROYAL SCHOOL OF MINES.

An inaugural dinner of Royal School of Mines men resident in South Africa, which it is hoped will become an annual event, was held at the New Club, Johannesburg, on Saturday, October 8, 1904. The chair was to have been taken by Mr. Weldon, Acting Commissioner of Mines, who at the last moment was prevented through ill health from being present; and, in his absence, Mr. A. R. Sawyer, president of the Geological Society of South Africa, presided. Among those present were: H. E. Bradshaw, C. B. Brodigan, G. Carter, E. H. Clifford, F. H. P. Creswell, A. M. M. Cooke, De Chazal, P D. Durell, J. Duncanson, H. M. Eddowes, M. Ferguson, S. E. Fletcher, S. H. Ford, L. C. Franck, A. Goldwater, H. D. Griffiths, E. Hay, C. Baring Horwood, H. E. Hume, J. P. Johnson, C. F. Lamb, J. G. Lawn, H. F. Marriott, H. Meyer, D. Michaux, J. Morris, M. Park, H. Power, E. P. Rathbone, Reg. W. Robinson, H. F. Roche, R. A. Rouillard, C. B. Saner, P. Scholer, J. Sewell, F. Smith, R. B. Smith, U. P. Swinburne, R. B. Webber, D. Wilkinson, and A. Wood. The following gentlemen were unfortunately prevented from attending: F. L. Bensusan, A. J. Brett, D. L. James, J. I. Jameson, J. Harry Johns, H. L. Lezard, J. H. Lucas, P. Maxwell, J. H. Munnik, H. G. Nitch, A. E. Payne, Ralph Robinson, T. Simpson, C. M. Stewart, J. E. Vaughan and H. Weldon. After the royal toast had been duly honored, the chairman, Mr. A. R. Sawyer, in proposing the toast of the Royal School of Mines, laid special stress on the high tone imparted to that institution by its two mining professors, the late Sir Warington Smyth and the late Sir Clement le Neve Foster, which has made itself distinctly felt on all those who had the privilege of studying under them. It was also announced that the following telegram would be sent to the Dean, Professor Judd, of the Royal School of Mines, London: "Royal School of Mines men met Johannesburg annual dinner Saturday; wish Old School prosperity," which announcement was received with cheers. Other speakers were Messrs. E. P. Rathbone, J. G. Lawn, C. B. Brodigan, U. P. Swinburne, H. D. Griffiths, D. Wilkinson, H. F. Marriott, C. Baring Horwood, E. Hay and F. H. P. Creswell. The last mentioned gentleman in a very able speech referred to Professor Huxley having inoculated the necessity of the application of the scientific method to mining; and the importance of following the dictates of logical reasoning as opposed to forming hasty opinions on insufficient premises. He then went on to point out that the training at the Royal School of Mines was eminently of a character to fit its students thus to use their reasoning faculties, which point was also emphasized by Professor Lawn.

OBITUARY.

G. M. King, of the Victoria Anexas mines at El Oro, Mex., died on October 15 from typhoid fever.

J. W. Castleman, for many years superintendent of the furnaces of the Sloss-Sheffield Steel & Iron Co. at Birmingham, Ala., and a noted Alabama mineral expert, died at the age of 65 years, on November 3.

Joel Farist, president of the Farist Steel Co., died November 12 at Bridgeport, Conn., following a period of failing health, aged 72 years. He founded and was president of the Bridgeport Crucible Co. He was a native of Sheffield England.

SOCIETIES AND TECHNICAL SCHOOLS.

Lehigh University.—The Mining and Geological Society has been formed by the students of mining at this institution, at South Bethlehem, Pennsylvania.

Thomas S. Clarkson Memorial School of Technology.—The international jury in group 3, higher education, of technical schools, etc., has awarded a bronze medal to this institution, at Potsdam, N. Y. The exhibit was warmly commended by the members of the jury, and has been a source of interest to visitors throughout the summer.

TRADE CATALOGUES.

John J. Hill, of Oakland, Cal., is sending out an illustrated booklet descriptive of the Pacific gold washer and amalgamator.

A circular issued by the Michigan Pipe Co., of Bay City, Mich., describes the improved Wyckoff water pipe which it manufactures.

J. Q. A. King, of Phoenix, Ariz., the inventor of King's power-driven gravity muller, has prepared a bulletin which describes his invention.

Pamphlet No. 25, issued by W. J. Clark, of Salem, Ohio., is devoted to a description of the Lane patented joist or timber hanger, which it manufactures.

The Federal blue-printing machines are described, with illustrations, in a circular prepared by the Spaulding Printing Paper Co., Inc., of Boston, Massachusetts.

The Fort Wayne Electric Works, of Fort Wayne, Ind., has issued bulletin No. 1,058, in which is described its multiphase revolving field generators, engine driven.

The Smooth-On Manufacturing Co., of Jersey City, N. J., has prepared a 100-page book showing its different products. It will be sent out to any one who writes for it.

Dodge & Day, engineers, of Phoenix, Ariz., have issued a card containing a reproduction of photograph of the new plant of the Jeansville Iron Works Co., of Hazleton, Pennsylvania.

The Roessler & Hasslacher Chemical Co., of New York, has issued a unique circular in the form of an invitation to visit its booth representing "The Old Alchemist" at the St. Louis Exposition.

Arthur Koppel, of New York, has issued a booklet illustrating and setting forth the uses of narrow-gauge railway material. It consists of 22 pages and cover, with an appropriate design on the front entitled "On the Track."

Bulletin No. 343, issued by the Ingersoll-Sergeant Drill Co. and the Westinghouse Traction Brake Co., of New York, is given up to a description of the storage air brake system of the St. Louis Transit Co., which was installed by these companies.

F. Weber & Co., of Philadelphia, are sending out a compact little catalogue of Riefler's drawing instruments, containing descriptions and testimonials, together with circulars describing Riefler's new dotting instruments and Riefler's fountain pen.

'Good Words' is the title of a little book issued by the Bennett Fuse Co., of Victoria, B. C. It contains a description of Bennett's white countered gutta percha and safety fuse, with testimonials from those who have used the fuse and found it satisfactory.

INDUSTRIAL.

The A. S. Cameron Steam Pump Works, of New York, were awarded a gold medal by the Louisiana Purchase Exposition.

The Mines & Metallurgical Co. has removed from No. 52 to No. 11 Broadway, New York, where it has more commodious offices. Mr. Charles E. Finney is president, Mr. Hermann A. Keller vice-president, and Mr. Walter Renton Ingalls, secretary and treasurer.

The Blaisdell Co., of Los Angeles, Cal., has received a cablegram from Johannesburg, South Africa, stating that the equipment installed at the Robinson Gold Mines, Ltd, is working very satisfactorily, and that the 40 ft. by 8 in. class 'A' excavator is delivering, in good condition, 100 tons per hour on 15 horsepower.

The Northern Electrical Co., of Madison, Wis., reports among recent sales of Northern dynamos and motors in brewing work, extensive equipments supplied to the Kranz Brewing Co., Findlay, Ohio; Indiana Brewing Co., Indiana, Pa., and the Olympia Brewing Co., Olympia, Wash.

The Burt Manufacturing Co., of Akron, Ohio, reports that it has recently sent one of its large oil filters to the National Steel & Wire Co. at New Haven, Conn., to which it has already sold a number of Cross oil filters. The company also recently sold two Warden oil filters to the Lehigh Valley Coal Co. Two of its 100-gal. oil filters have also been sent to the La Belle Iron Works, Steubenville, Ohio, for use in connection with an oiling system which this plant operates.

The new copper refinery of the Tacoma Smelting Co., Tacoma, Wash., will contain 272 tanks. Of these tanks, 250 are for regular use, the others for making starting sheets. The refinery will have a capacity of 25 to 30 tons of cathodes per day, and will be equipped with a 3-ton electric crane with 60 feet span, and a Walker casting machine for casting wire bars and ingots. Power will be furnished by two direct connected motor generator sets, built by the Westinghouse Electric & Manufacturing Company.

The National Electric Co., of Milwaukee, has entered into an important arrangement with Robert Lundell and Robert T. Lozier, by which the National company will manufacture and market the new motors and generators and systems of operation and control that are covered by the latest inventions of Robert Lundell, the commercial direction of the undertaking being placed in the hands of Robert Lozier, who will also act as general manager of the electrical sales department of the National company.

The power plant for the new shops of the Mexican Central Railway Co., at Aguascalientes, Mex., contains a Sturtevant induced draft apparatus, consisting of two steel plate fans, each driven by a Sturtevant vertical engine. Each fan is capable of maintaining a draft pressure in the flue connection of each boiler equal to ¾ of an inch of water when handling all the gases of combustion, burning 35,000 lb. of coal per hour, with a flue temperature of 600° F. The ring oiling fan bearings next to the fan are water-jacketed to prevent overheating. A counterbalanced sliding damper permits either fan to be cut off from the flues, or both may be operated at the same time. The engines are provided with regulating valves, which automatically control the steam pressure.

A grand prize has been awarded by the Louisiana Purchase Exposition to the Laidlaw-Dunn-Gordon Co., of Cincinnati, which installed the two large compressors located in Block 33 of Machinery Building. One of the machines has a capacity of 1,300 cubic feet of free air per minute when running at 125 revolutions, and is used to supply the general compressed air requirements of the Exposition, while the other is capable of furnishing 530 cubic feet and supplies the transportation exhibits. The large machine is fitted with an improved type of valve gear, the distinguishing feature of which is the novel manner of using poppet valves for controlling the opening of the discharge in combination with the semirotary, mechanically moved valves for controlling the closing of the discharge and the opening and closing of the suction.

GENERAL MINING NEWS.

Chesapeake & Ohio Railway Co.—Coal and coke shipments are officially reported as below, in short tons:

Coal.	September.	July-Sept.
New River	367,266	1,300,028
Kanawha	178,417	491,276
Kentucky	8,263	21,637
	553,946	1,812,941
From connections	11,407	33,164
Total	565,353	1,846,105
Coke.		
New River	15,600	43,484
Kanawha	2,051	6,285
	17,651	49,769
From connections	49	522
Total	17,700	50,291
Grand total coal and coke	583,053	1,896,396
Total, 1903	422,938	1,337,302

The increase this year was principally in the shipments of New River coal to tidewater.

ARIZONA.

GRAHAM COUNTY.

Arizona Copper Company, Ltd.—This company reports that the production of its mines at Clifton for the month of October was 1,157 short tons of copper.

Michigan-Arizona Mining Co.—This company, at Safford, is sinking a double compartment shaft on a 75-ft. ledge, and cut through the iron capping at 30 ft. and into a lime formation. This formation is 40 ft. wide, and averages 0.25 per cent sulphides. Additional men will be put on at once, and sinking will be done as rapidly as possible.

Starlight.—Superintendent J. C. Ermann reports that shipments are being made regularly from the mine at San Carlos. The working tunnel is in nearly 1,500 ft., and contracts will be let next month for machinery to more than double the present capacity of the power plants. The ore runs high in gold, silver, copper and lead.

CALIFORNIA.

AMADOR COUNTY.

Defender Mining Co.—At this property, at Defender, in the Pioneer district, a new shaft is being sunk.

Kennedy Mining & Milling Co.—The additional 40 stamps of the mill of this mine, at Jackson, will be ready to drop by the end of this month. The enlarged chlorination plant is now in good working order.

Zeila Mining Co.—At this mine, Jackson, excavations have been begun for the new hoisting works, and sinking operations in the shaft are continued.

BUTTE COUNTY.

Boston & Oroville Dredge Co.—Dredge No. 3 of this company is now in operation on the Wilcox tract, near Oroville, with C. W. Gardner as superintendent, and F. Darneille as dredge master. The dredge machinery was built by the Marion Steam Shovel Co., of Marion, Ohio.

CALAVERAS COUNTY.

Lightner Mining Co.—This company, at Angels, has re-elected its old board of directors, which assures the continued superintendency of Alex. Chalmers, who has successfully managed the property for some years.

Utica Mining Co.—This company, at Angels, is completing the erection of a 20-drill compressor, with a fly-wheel 16 ft. high and 40 in. face. The compressor will run the drills and also furnish air for the men in the Cross and Stickels shafts.

EL DORADO COUNTY.

Landecker.—The new mill at this property is now in full operation.

INYO COUNTY.

Republican.—In this mine, Ballarat, a large body of high-grade ore has been developed in a winze in No. 2 tunnel. The mill is making excellent returns.

KERN COUNTY.

Barbaroso.—It is reported that this mine, in Amalie district, three miles from the Zada mine, is showing up a large vein of very good ore.

Zada Mining Co.—The property of this company is in Amalie district, 13 miles east of Caliente. The main shaft is down 400 ft. The mine has been relocated a number of times in the last dozen years, but systematic work was only done after it was acquired by H. H. Blood and associates, who own, with it, 18 adjoining claims. The ore is of such a character that it must be smelted, and it is being shipped to the Selby works for that purpose. The ore being taken out is exceptionally rich, some $83,000 having been produced in the last five months. There are several tunnels on the claim. The richness of the ore produced has caused quite a boom throughout the district.

NEVADA COUNTY.

Consolidated Nevada Gold Mining Co.—This is a new organization, formed under the laws of the District of Columbia, to reopen the Julia mine, adjoining the Mountaineer mine, on Deer creek, Nevada City. The 400-ft. drain tunnel will be at once retimbered and extended.

Gold Bank.—Mill tests of $40 per ton form a wide ledge, are the reports from this mine, at Maybert. The lower tunnel has developed a ledge which the owners believe to be an extension of the famous Eagle Bird.

Sixteen-to-One.—A new large vein of good ore has been found in this mine, at Washington. The 10-stamp mill is kept busy on ore, and 10 stamps more are on the way to the mine.

PLACER COUNTY.

Ex-Ray.—This mine, at Sailor Cañon, is about to be started up again.

Golden West.—This mine, at Canada Hill, has been closed down for the winter.

Salvation.—At this mine, near Canada Hill, the 10-stamp mill is kept busy on good ore.

Santa Fé.—This mine will be started up again as soon as there is a water supply.

PLUMAS COUNTY.

Blue Gravel Mining Co.—This company is now sending in supplies, so that the claim may be worked during the winter. The general outlook is considered satisfactory.

RIVERSIDE COUNTY.

United States Tin Mining Co.—This company, which is reopening the old Temescal tin mines, is reported to have found a body of ore of favorable percentage.

SANTA BARBARA COUNTY.

Kaider.—This oil well, in the Santa Maria region, broke out into a "gusher" recently, spouting the oil out of an 8-in. pipe 100 ft. into the air. The well at present is 2,000 ft. deep.

SHASTA COUNTY.

Gambrinus.—This is the mine, near Whiskeytown, where the bondees failed to pay the miners, and the latter are now working it as lessees. The miners have recently taken out $4,000 from 150 tons of ore. The property is owned under bond by the California & Montana Mining Co., A. J. Glass, manager. There is a 550-ft. tunnel, which taps the orebody far below the old workings of 20 years ago. The good ore is being taken from the face of this tunnel. There is a two-stamp prospecting mill on the mine.

Mariana Marsicano Mining Co.—This company, operating the Sunny Hill mine, near Ono, Mr. L. F. Barlow, superintendent, now has 30 men at work. A new cyaniding plant is being installed.

SISKIYOU COUNTY.

Crater Creek Mining & Development Co.—The groups of mines on Crater creek, east fork of Scott river, owned by Chas. M. Reeder, has been sold to this company, and the mines are to be operated on an extensive scale.

STANISLAUS COUNTY.

Golden Leaf Mining Co.—The plant of this company, near Eugene, with the exception of the hoisting works, has been destroyed by fire. The engines, buildings, etc., are to be replaced at once. A ledge of fine ore was discovered in the mine the day before the fire. The men were all taken from the mine safely. The stamp mill was entirely destroyed.

COLORADO.

BOULDER COUNTY.

Lincoln Mining & Milling Co.—This company has been incorporated, with capital stock of $100,000, with Charles O. Hugo, Nels M. Nelson and David Davidson as incorporators.

Nederland Tungsten Mining Co.—Contracts have been closed with one of the largest steel manufacturers in the United States amounting to over $100,000, for tungsten ores carrying $6 and $8 per unit. Two lots have been shipped, giving returns of $6,750, leaving a net profit of $2,112. The company intends to instal new machinery on its property, of which Louis B. Beeding, Boulder, is superintendent.

GILPIN COUNTY.

Banzai Mining Co.—Denver and St. Louis capital is interested in the purchase of this property, near Black Hawk, from local owners, the sale being made through Louis R. Tatum, of Denver. A plant of machinery is to be installed, and sinking and other work will follow on an extensive scale. A. Watters, Nevadaville, Colo., is superintendent.

Colorado-Tellurium Gold Mining Co.—Paterson (N. J.) and New York parties are interested in this company, which has purchased the Oliver 25 slow drop stamp mill, which cost about $22,500 four years ago. The company has started it up and will run it on ores from its Freedom property, where heavier operations are to be carried on, including unwatering and sinking of the deep shaft. Richard Borcherdt is manager.

Independent Smelting & Refining Co.—This company, operating the smelter at Golden, has taken the Miner's sampling works, at Black Hawk, owned by local parties, and the 75-ton plant is being put in running order after a 'freeze-out' by the smelter trust of nearly two years ago. Ores will be sampled and tailing purchased and shipped to the Golden smelter. The plant has been promised a liberal percentage of the ores of this county, as the mining men are desirous of keeping up the Golden smelter. Denny H. Allen, Central City, Colo., is manager.

Rialto.—The East Boston Mining Co. has purchased the Rialto and Jean lodes and surface property in Gregory district, and will operate it in conjunction with its East Boston property, connecting the properties at an early date. The Rialto is credited with a production of over $500,000, and the new purchasers intend operations on a liberal scale. The East Boston property has been producing smelting ores which run between $140 and $150 to the ton, and it has maintained a regular product of milling ores of a fair grade. On account of large amount of water, it was impossible to work the lower levels, but with the Rialto group the company is in shape to develop both on a large scale. Stephen Hoskin is manager.

LAKE COUNTY—LEADVILLE.

Cloud City.—The shaft is now in dolomite lime, and by the beginning of the week will reach the parting quartzite. So far, the formation gone through is the same as that in the Coronado, and there is now little doubt but that the Cloud City will catch the Midas ore-shoot.

Resurrection.—The mill at this property is turning out 200 tons daily of a high-grade concentrate, while the mine is shipping three car-loads daily of the crude material. A large force of men is employed underground doing development work.

Sedalia.—Unfortunately for the owners of this property, at South Evans, the mine was run into debt and closed for several years. The most pressing creditors were settled with, and a few months ago the mine resumed work. This was carried on at the bottom level, 1,000 ft., and several good stringers of ore have been found, running from one to five ounces gold, 10 oz. silver and 20 per cent lead per ton. The feeders are strong and will undoubtedly lead to the main orebody. The character of the ore is the same as found in the Resurrection and Fortune.

Small Hopes.—After being shut down for a month, the Emmet, on this group, has resumed work, and the lessees are opening up new territory. The Boreel is shipping about 30 tons daily of a good grade of sulphide.

Fortune.—James McNeece, the owner, has been working the mine steadily for several months and shipping a very good grade of ore. Recently he opened a body of ore in the lower level that runs as high as 20 oz. gold per ton; he settled for one lot of 40 tons on this basis. There is a considerable quantity of this ore. The lower grade of ore is shipped regularly, and will hold up to better than an ounce gold per ton. The Fortune lies south of the Resurrection.

TELLER COUNTY—CRIPPLE CREEK.

Homestake.—Good progress is being made on the erection of this mill on Ironclad hill. The capacity of the mill when completed is to be 1,000 tons of ore per day. The process used is to be cyanide, and is designed to treat the low-grade oxidized ores of the property of the Homestake Co.

Victor.—Some ore is being shipped from this property by lessees. This property was formerly one of the largest mines in the district, and took out a large amount of ore. The company paid $1,155,000 in dividends in its best days. Of late, however, only lessees have been working on the property. The property is at present owned by D. H. Moffat, of Denver, who was formerly one of the principal stockholders of the Victor Gold Mining Co.

Vindicator Consolidated Gold Mining Co.—The output of this property is about 1,500 tons per month of fair grade ore. Aside from the output, the condition of the mine is very good. Besides the work done by the company, a number of lessees are at work, some of whom are taking out good ore.

ILLINOIS.

SANGAMON COUNTY.

Peabody Coal Co.—An explosion in the mine of this company near Springfield, on November 10, caused the death of two men and damage amounting to $10,000 . The explosion resulted from a "windy" blast, and is supposed to have been intensified by coal dust.

LOUISIANA.

CALCASIEU PARISH.

Jennings.—This field is producing from 35,000 to 40,000 bbl. daily, or more than the total output of all other southern fields. Prospects are good for continued heavy production, although it is well to bear in mind that a few gushers are producing the bulk of the output, and there is no certainty that the flow will continue for any long period.

PENNSYLVANIA.

BITUMINOUS COAL.

Cascade Coal & Coke Co.—This company has awarded contracts for equipping its new power plant near Dubois. The entire plant will cost about $200,000.

Connellsville Coke Co.—This company has transferred to the Republic Iron & Steel Co. valuable holdings in the south and west portions of Fayette county.

H. C. Frick Coke Co.—This company has purchased the output of the Oliver Snyder Steel Co., amounting to about 2,500 tons daily.

Pittsburg Coal Co.—This company has taken a five years' lease of the property around Pittsburg recently acquired by the Wabash railroad. The company has been awarded the grand prize for its exhibit at St. Louis.

Possum Glory Coal & Coke Co.—This company has contracted for tipples, cars and other equipment necessary for the development of 10,000 acres of coal land in Indiana county.

UTAH.

JUAB COUNTY.

Grand Central—Victoria.—An understanding has been reached about boundaries at these mines, and hereafter vertical lines will govern. Arrangements have also been made whereby the Victoria is to bring its ore to the surface through the workings of the Grand Central. Mining has already begun on the 1,500-ft. level.

Uncle Sam Consolidated.—The hoisting plant built to replace the one destroyed by fire is in commission.

SALT LAKE COUNTY.

Continental Alta.—Work is progressing favorably with the construction of the aerial tramway for this property. The upper head house is well under way, and several of the towers are up.

Pittsburg-Alta.—An important strike has been made at this property, at the head of American Fork cañon.

SUMMIT COUNTY.

New York Bonanza.—In the winze from the 400-ft. level, the vein of ore that has been followed for some time shows signs of permanency. The values have increased and the outlook on the whole is encouraging.

South Quincy.—Ore has been encountered in this property, which covers an extension of the original Swansea vein.

WASHINGTON.

FERRY COUNTY.

Manila.—Work at this mine will be started immediately. The lower tunnel will be driven across the vein to the hanging wall. The vein has already been penetrated over 100 ft., with increasing values.

Midnight Mining Co.—A new wagon road is under construction from Park City to the main Sans Poil valley road at West Fork. It will be ten miles long. When finished, regular shipments will be made to the smelter. The Mountain Bay mine has a 6-ft. vein of argentiferous galena ore of high value, assays running up to $5,000 per ton in gold, silver and lead. The ore comes from an upper tunnel, from which a winze is being sunk on the vein. A lower tunnel, being driven, is in about 300 ft., and nearing the vein. The ore is brought to West Fork at present by pack train.

Mountain Lion.—The management has secured a new contract with the Granby smelter, and will ship from two to three carloads of ore a day.

Pearl Consolidated Mining Co.—Steps are being taken to collect assessment No. 5 on all delinquent stock. It is stated that a compressor plant has been arranged for, and that work will be resumed in the new shaft at an early date.

Quilp.—It is rumored that the managers have secured a contract for delivery of a large tonnage of ore to the smelters, at a transportation and treatment rate of $4 a ton, and will resume work shortly.

FOREIGN MINING NEWS.

AUSTRALIA.

WESTERN AUSTRALIA.

The total gold production from the mines of Western Australia in October is reported at 208,926 oz. bullion, an increase of 18,141 oz. over October, 1902. For the 10 months ending October 31, the total was 1,979,255 oz. bullion, which compares with 2,033,067 oz. for the corresponding period in 1903, showing a decrease of 53,812 oz. The bullion reported this year was equal to 1,654,408 oz. fine gold, or $34,196,615 in value.

CANADA.

BRITISH COLUMBIA—BOUNDARY DISTRICT.

Boundary Ore Shipments.—Shipments for the week ending November 5 were as follows, in tons: Granby, 9,600; Brooklyn-Stemwinder, 1,710; Mother Lode, 4,032; Emma, 1,122; Mountain Rose, 132; Athelstan-Jack Pot, 210; Oro Denoro, 66; Senator, 240; total for week, 17,112; total for the year, 678,273 tons.

BRITISH COLUMBIA—ROSSLAND DISTRICT.

Rossland Ore Shipments.—Shipments for the week ending November 5 were as follows, in tons: Le Roi, 2,700; Centre Star, 780; Centre Star (milled), 540; War Eagle, 1,140; War Eagle (milled), 210; Le Roi No. 2, 190; Jumbo, 540; White Bear (milled), 60; Rossland View, 20; total, 6,180. Total for the year, 293,855 tons.

MINING STOCKS.

(Full quotations on pages 814 and 815.)

New York. Nov. 16.

The stock market has settled to a point where public buying is again noticeable, and, encouraged by the improved business outlook, share values have risen. Amalgamated Copper, though exchanging only a moderate number of shares, advanced from $73.50 to $76.875. The interest displayed in this stock recalls the fluctuations of 1903, when the price rose to $75.625, and when the low mark was $33.625—a difference of $42, which, by the way, is somewhat more than has been shown in the current year's trading. Anaconda is also in better form, taking a jump to $30 from $26.50. Tennessee marches on, and after selling at $32 @$35.50, advanced to $37.25. Greene Consolidated fluctuated within narrow limits, rising at one time to $25.25. United common was active, selling up to $11, and there was a sale of 300 preferred at $58@$64.

For the first time the Federal Mining & Smelting securities have been called on 'change. On November 11 the common stock sold at $45, but on the 15th gained to $47.50, while the preferred moved at $50@$79.75. Both shares have a par value of $100, and during the year ending August 31, 1904, yielded dividends at the rate of 6% per annum on the $5,250,000 outstanding common, and 7% on the $10,500,000 preferred. The company will retire $500,000 par value preferred stock and $250,000 common, thus leaving the issued capital stock, $10,000,000 preferred and $5,000,000 common. There are no outstanding bonds or mortgage and no floating debts.

Sales of Quicksilver preferred are reported at $3.50@$5.125, and of the common at $2@$2.40. Ontario Silver, of Utah, was firm at $3.75, Daly at $1.90 and Horn Silver at $1.60@$1.65.

Portland of Cripple Creek, Colo., after gaining 20c. to $1.95, slipped off to $1.65. Elkton brought 64@66c.

The Comstocks attracted a little more attention. Consolidated California & Virginia sold at $1.65@$1.70; Ophir at $2.25@$2.05; Mexican, $1.15, and Hale & Norcross at 63c.

The Standard Oil Co. has declared a 7 per cent quarterly dividend, payable December 15, making 36 per cent for the year, against 44 per cent for 1903 and 45 per cent in 1902. The market had forecasted a reduction in the dividend, hence the stock sold down to $635, from $650. In the aggregate this year's dividends total $34,920,000, which compares with $42,680,000 in 1903.

Boston. Nov. 15.

(From Our Special Correspondent.)

There has been a good market for mining shares, but it is far from sensational. In fact, copper shares hardly reflect the strength of the metal, which is due to the fact that the public has not entered the market to any great extent, as yet. Up to the present there has been no attempt to "balloon" prices. There have been strong gains, and quite a considerable interest is manifest among the low-priced shares, but there is little of the excitement witnessed back in 1899, when the great copper boom was on. The present price for copper means big earnings for those companies that are beyond the development stage, and sooner or later stockholders will derive the benefit.

Noteworthy during the week is the $50 advance in the price of Calumet & Hecla to $675 per share. Quincy has scored a $13 advance, touching $119; Tamarack a $13 advance, touching $140; and Wolverine is up $7.50 to $107.50. Amalgamated has advanced $3.37½ to $76.62½, and a much higher price is talked for it this winter. The fact that the Kearsarge lode has been reached in the Allouez mine brought an active speculation in this as well as Atlantic, Franklin, Centennial and other Lake Superior mines. Allouez touched $21, closing at $20, against $14.37½ a week back; Atlantic rose $5.75 to $22.25, but went back to $20.25; Centennial touched $33, on active trading, but fell back to $30.75. The close a week ago was below $30. Franklin rose $3.50 to $15.50, subsequently reacting $1. Mohawk rose $2.50 to $56, losing $1 of it. Osceola is up $5 to $96, where the supply is more free. Copper Range has also given a good account of itself, rising $7.50 to $72.50, which is within $2.50 of its record price. Dealings in the latter have been on a large scale, and for the two hours of Saturday last, the total was 9,300 shares. On Friday they were 14,500 shares.

Utah took a spurt to-day and rose to $45.50, which is $2.50 above a week ago. Manipulation is still very apparent in United States Mining, and there is considerable pressure to hold the price of the stock down. It touched $25.25, but is held near $24 most of the time. The best opinion is that New York interests have acquired about 75,000 shares at between $21 and $25 per share, and may ask for representation on the board. It is said that the United States Mining people have planned to build a smelter for the Mammoth property, lately acquired in California, and that the Trinity mine ore will also be treated at this smelter. Trinity has fluctuated widely at times. It rose from $14.25 to $18.50, but broke to $16.50, closing near the latter. Parrot touched $33 on the dividend announcement of 50c.; this is up from $28.50 a week ago. Isle Royale took a spurt up to $35.25, but on heavy profit taking fell back to $30.25; it closes the week, however, with a net gain of $5.25. Mass touched $8.25 on the $2 assessment announcement.

Colorado Springs. Nov. 11.

(From Our Special Correspondent.)

The past week on the local exchange has been badly neglected for politics, and not much interest was shown in the purchase of Cripple Creek shares. However, the fore part of the week was considerably more active than the latter. Prices on the average are lower than a week ago, although a few stocks show a gain.

It seems to be the general belief that Cripple Creek will not be permanently affected by the election, and although it may be unsettled for a time, it will not be of long duration, as both parties have great confidence in the ability of Adams to properly handle the situation.

During the week El Paso gained about 2c., selling to-day for $1.18. Cripple Creek Consolidated also advanced about 1¼c., and sold for 9¾c. Isabella dropped off a fraction, selling for 19⅞c. Vindicator sold for 67½c. C., K. & N. is quoted 20½-22; Elkton, 66@68c.; Portland, $1.65@$1.78; Work, 7½@7⅝c. per share.

Salt Lake City. Nov. 12.

(From Our Special Correspondent.)

Mining stocks have remained quite steady during the past week, the fluctuation in price being very slight; in fact, unusually so. New York Bonanza, the Park City stock which strengthened on account of improved physical conditions, continued in demand, but this became well supplied towards the end of the week, when the price slackened. Daly-West was the only other Park City stock traded in, and that at a lower price. The Columbus Consolidated mill, at Alta, is in operation. The first shipment of concentrates will probably reach the market during the coming week.

San Francisco. Nov. 10.

(From Our Special Correspondent.)

The week on the exchanges was broken up a little by election excitement and the election holiday. Business in the Comstocks was fair and prices steadier than for several weeks. The trading in the Tonopah stocks on the old exchange is rather on the increase. Some quotations noted are: Ophir, $2.45; Consolidated California & Virginia, $1.85; Best & Belcher, $1.10; Hale & Norcross, 69c.; Sierra Nevada, 28c.; Savage, 26c. per share.

On the San Francisco & Tonopah exchange sales were large, and a good many buying orders were in evidence. Montana Tonopah brought $1.90; Goldfield Nevada, 60c.; Bullfrog, 45@48c.; Jumbo, 43@47c.; McNamara, 22c.; Sandstorm, 20c. per share.

On the California exchange there was some activity in oil stocks, with prices quite steady, and some new stocks coming forward. Reed Crude sold for $2; Fulton, 75c.; Home, 65c.; Sovereign, 34c. The heaviest trading was in the lower-priced shares.

COAL TRADE REVIEW.

NEW YORK, Nov. 16.

ANTHRACITE.

The anthracite trade continues to show largely a weather market. The local yards generally are not overstocked, and any change in temperature has an immediate effect upon the wholesale trade, as well as in retail business. The cold snap this week, however, lasted only a couple of days, and has been followed by moderate weather, so that the effect on business has been comparatively slight. Demand for the prepared sizes is fair for stove and chestnut, but only moderate for other sizes. For the small or steam sizes business is rather quiet, and comparatively little is doing.

At the mines matters are rather quiet, but most collieries are running steadily and making about the usual shipments. There seems to be little or no difficulty about car supply, except for the western trade, in which there are some complaints that transportation is not furnished as rapidly as it is required.

October shipments were large, being reported at 5,131,542 tons, an increase of nearly 1,200,000 tons over the corresponding month last year. For the 10 months ending with October the total reported this year is 47,305,310 tons, which is only 3,706,625 tons less than the extraordinary shipments of 1903 up to the same date.

For prepared sizes prices continue unchanged, at $4.75 for lump, and $5 for egg, stove and chestnut, f. o. b. New York harbor. For steam sizes, pea coal continues to be quoted at $2.75@$3; buckwheat, $2.50 down to $2.25, according to quality, whether free-burning or hard; No. 2 buckwheat, or rice, can be had at around $1.50, and No. 3 buckwheat, or barley, at about $1.35 per ton, New York harbor.

BITUMINOUS.

The soft coal trade at the Atlantic seaboard is in a strong position; demand is heavy, and prices are 5 to 10c. higher. Practically nothing is now heard about $2.25@$2.35 grades of coal. The car supply is still very short, especially on the Chesapeake & Ohio road. Trade in the far East is taking considerable coal. The main ice-making ports are calling urgently for their usual last cargoes. Trade along the Sound has not abated, and orders are above normal. At New York harbor there has been a relaxation in demand. Prices for ordinary Clearfield coal are $2.50@$2.60 per ton, f. o. b. New York harbor shipping ports.

All-rail business shows greater activity. Some producers are restricting this trade in favor of tide deliveries, which are inquiring for more coal than usual. Transportation from mines to tide is excellent, and the quick dispatch makes up in part for the shortage in the car supply. Cars on the Virginia roads meet only about 25 per cent of the demand, but on the Baltimore & Ohio and the Pennsylvania lines the proportion is 75 to 85 per cent.

The coastwise vessel market shows a sufficient supply of large craft, which keeps freights down to as low a point as at any time during the year. From Philadelphia, quotations are 60c. to Boston, Salem and Portland; 65c. to Portsmouth; 75c. to Lynn and Newburyport, and 50c. to the Sound. We understand that Norfolk and Newport News rates are about the same. New York harbor freights are about 60c. around the Cape. This is probably due to the smaller sized craft lying at that point.

Lake coal trade, which is approaching its conclusion for the season, is only fairly active. The Sault canal returns up to November 1 show a decrease this year in shipments to Northwestern ports of 215,000 tons anthracite and 1,380,000 tons bituminous. In the Lake Michigan trade the decrease this year is nearly on the same scale.

As noted last week, the ill-advised strike of the hoisting engineers in Illinois has resulted in the disruption of their special union. The new agreement made is a contract between the Coal Operators' Association and the United Mine Workers of the Illinois district, and in that agreement it is provided that the hoisting engineers who are not already members of the United Mine Workers shall be-

come members, and the operators will use their influence to induce them to join. The agreement provides for a reduction of 5.55 per cent in wages, the new scale being that offered by the operators before the strike. The scale will run until April 1, 1906. The agreement also provides that the pit or local committees of the United Mine Workers shall have no jurisdiction over the hoisting engineers employed at any mine to safeguard the mine owners against damage and loss in the event of a strike of the miners. Nearly all the engineers so far heard from have accepted the agreement and gone to work.

Birmingham. Nov. 14.

(*From Our Special Correspondent.*)

The coal production in Alabama is still heavy. Some of the furnace operators whose union miners are on strike, and who have given employment to non-union men, are showing increased production right along. There are others, however, who are not doing so well with their non-union labor, so that it cannot be stated that the strike is all over. The leaders of the miners appear to have plenty of money at their command to keep up the struggle. Coke production is far from being sufficient to meet all needs in this district. The product is being imported extensively.

During the past week the Commercial Coal Operators' Association in this State, who have signed a temporary contract with the union miners, assented to an advance of 2½c. on the ton for coal mining, based on the average selling price of pig iron. The furnace companies did not grant their miners any advance, their individual contracts with the non-union men being based on a higher average than with the union men last year. It is admitted that there will be an advance again for the union miners and non-union men next month. The union miners look for the maximum wage of 57½c. per ton in mining, 50c. being paid now. It is absolutely certain that the maximum wage will be given in January, 1905.

From Walker county comes a report of another big coal land deal. The Jasper Land Co., through its president, sold to B. W. and A. F. Whitfield a large tract of coal land in the vicinity of Palos. The Whitfields are developing on a large scale in Walker county, and already have mines in operation in the neighborhood of Nauvoo. The consideration of the deal just made involves about $48,000.

The Jefferson county board of revenue is considering the proposition of using their convicts after this year in building county roads, instead of leasing them to corporations. No less than 400 of these convicts are used now in mining coal. The board of revenue members believe that more good can be accomplished by working the convicts on the road rather than leasing them out and then paying a high price for labor on the roads.

Chicago. Nov. 15.

(*From Our Special Correspondent.*)

The coal market, both anthracite and bituminous, has been quiet and steady in the last week. Sales of anthracite continue to be below the normal for the season, both in city and country. The west is dull and the northwest improving, as regards anthracite. In dock trade, stove coal is somewhat scarce, and in all-rail trade chestnut is in greatest demand. Dock receipts of anthracite are heavy, but the supply at western lake ports will be considerably below the supply of former years, at the close of navigation.

The short strike of the hoisting engineers at Illinois mines had the effect of relieving the local market from fine coal, which in the last two months has not paid the cost of shipping them. Shipments generally from Illinois mines have been restricted by the strike, and in many cases this was healthy for the trade. Demand is only moderate as yet for steam grades, with domestic grades improving slightly. Receipts from Indiana mines have been somewhat above normal, but the products of Illinois mines are now coming in freely again.

Indiana and Illinois lump brings $1.80@$2.40; run-of-mine, $1.60@$1.90; screenings, $1.20@$1.40.

Of Eastern coals, smokeless is firmest; the demand is large and steady; quotations are $2.95@$3.15. Hocking is in steady but not large demand, and is quoted at $3.10@$3.20. Splint from West Virginia is selling well at $3.30@$3.50. The demand for gas coals is rather light.

Cleveland. Nov. 15.

(*From Our Special Correspondent.*)

The coke trade has been the feature in fuels in this territory. The unusual demand from both furnaces and foundries has caused a buying movement of big proportions. The supply from the ovens has been steady, and in most instances the only check has come through the shortage of cars. The railroads have been short of box cars for various reasons, principally the slow movement of equipment, and accordingly the shipment of coke has lagged. The prices hold unchanged at $2.15 for furnace coke, at the ovens, and $2.50 for 72-hour foundry coke at the ovens.

The demand for steam coal has increased in proportion to the demand for coke, although the unusual sight is presented of a greater activity among the furnaces than among factories. The demand has been enough, however, to keep the prices stiffer, and now the general quotation on steam coal is $1.20@$1.25 for run-of-mine at the mine in either Ohio or Pittsburg territory. The call for slack is also stronger, and the situation seems to be generally better. Orders for spot shipment are filled at 40@45c. at mine, with contracts run-60@65c. In all instances there are exceptions where dealers and producers are selling 5c. under these prices.

Domestic coal here is not quite so strong. The demand is improving, but competition is strong and gas for fuel is having its effect. Prices are unchanged. As to lake coal, ordinarily the season would be drawing to a close, but now the ore movement will keep boats running late, and shippers will get a chance to move belated cargoes. The season, however, has only three weeks to run, at best.

Pittsburg. Nov. 15.

(*From Our Special Correspondent.*)

Coal.—The supply of railroad cars was a trifle better last week, and the output was heavier than for several weeks. Despite the advance in prices to $1.50 base for run-of-mine coal, the demand continues heavy. All the railroad mines are in full operation this week, and will continue unless prevented by a shortage of cars. The Pittsburg Coal Co. is doing more business than this time last year. The Pittsburg-Buffalo Co. reports that its business for October was 60 per cent greater than the same month last year, and from the new orders so far received, the trade this month will exceed that of November, 1903, by from 70 to 80 per cent. But few of the river mines are in operation, owing to low water and the uncertainty when the rivers will be navigable to permit shipment to the lower markets. There are from 25,000,000 to 30,000,000 bushels of coal loaded and ready to go out on the first rise.

Connellsville Coke.—Prices continue firm, and it is predicted that, when heavy contracts are made for next year, the minimum price will be $2 a ton for furnace coke. Sales for prompt shipment are made at a higher rate. Foundry coke is quoted at $2.25@$2.50. The production last week amounted to 193,282 tons, an increase over the previous week of 7,205 tons. The shipments aggregated 9,216 cars, distributed as follows: To Pittsburg and river points, 3,206 cars; to points west of Pittsburg, 4,495 cars; to points east of Everson, 1,515 cars. This was an increase of 283 cars compared with the shipments of the previous week.

San Francisco. Nov. 10.

(*From Our Special Correspondent.*)

Mr. J. W. Harrison's circular, of this date, says: "Since our last, there have been but three arrivals of Australian coal; total, 8,773 tons. Notwithstanding the apparent liberal arrivals for October, which footed up in all 23,719 tons, the quantity received in October, 1903, was more than double than this amount, being 47,967 tons. Yet for the moment there is a bounteous supply for immediate requirements. There are 17 vessels (11 now en route) which are on the chartered list from Australia to this port; they will carry in all about 45,000 tons. But few names are being added to the engaged list, as shippers are not prepared to pay the present asking rates; the result is, shipments of colonial coal are gradually diminishing. Shipments from our coast collieries are coming forward freely, and are finding ready sale on arrival. Shippers are enabled to put their colliery output into this market at a pretty low figure, as carriers are procurable for transporting same at reduced rates. Trade generally in this line is showing an improvement, as volume of trade at this season of the year always enlarges. There is no perceptible change in values asked by either the wholesale or retail dealers. Fuel oil still holds its sway, as a steam producer, the price is low, and the demand is large. There appears to be next to no limit of the quantity offered for sale."

For Pacific Coast coals, in large lots to dealers, quotations are: Wellington and New Wellington, $8; Richmond, $7.50; Roslyn, $7; Seattle and Bryant, $6.50; Beaver Hill and Coos Bay, $5.50; white ash, $5.25. For Rocky Mountain coals, also in large lots to dealers, prices named are $8.50 for Castle Gate, Clear Creek, Rock Springs and Sunnyside; Colorado anthracite brings $14. For Eastern coal, quotations are largely nominal, supplies being light. Pennsylvania anthracite is $14 and Cumberland $13. For English coal, quotations are ex-ship: Welsh anthracite, $13; cannel, $8.50; Wallsend and Brymbo, $7.50 per ton.

Foreign Coal Trade. Nov. 16.

In its latest advertisements, for bids for carrying coal from Norfolk, Newport News, Baltimore or Philadelphia, to Manila, the Navy Department specifies that American vessels only will be accepted. This is the first time that such a requirement has been made. The bids are to be for carrying 25,000 tons of coal.

The production of coal in Germany for the nine months ending September 30 was as follows, in metric tons:

	1903.	1904.	Changes.
Coal	86,082,746	88,910,291	I. 2,827,545
Brown coal	32,776,523	34,938,033	I. 2,161,510
Total mined	118,859,269	123,848,324	I. 4,989,055
Coke made	8,483,601	9,095,480	I. 611,879
Briquettes made	7,570,177	8,311,871	I. 741,694

Of the total reported 83,080,781 tons of coal and 29,768,429 tons of brown coal were from the mines of Prussia.

Imports of fuel into Germany for the nine months ending September 30, were as follows, in metric tons:

	1903.	1904.	Changes.
Coal	4,972,095	5,128,395	I. 156,300
Brown coal	5,901,798	5,518,189	D. 383,609
Coke	321,350	381,919	I. 60,569
Total	11,195,243	11,028,503	D. 166,740

The principal imports of coal were from Great Britain; of coke from Belgium. All the brown coal, or lignite, was from Austria.

Exports of fuel from Germany, for the nine months ending September 30, were as follows, in metric tons:

	1903.	1904.	Changes.
Coal	12,757,841	13,028,463	I. 270,622
Brown coal	17,172	16,987	D. 185
Coke	1,880,351	2,021,001	I. 140,650
Total	14,655,364	15,066,451	I. 411,087

The chief exports of coal were to Austria, Belgium, Holland and Switzerland; of coke to France and Belgium.

IRON TRADE REVIEW.

NEW YORK, Nov. 16.

The iron market is in a rather excited condition, and in fact there is a possibility that it may run away with itself. Prices for all sorts of material are advancing, and there is talk of a scarcity of pig iron for short deliveries. Part of this, possibly, is for effect on contracts for next year, but there is no doubt that the tendency is upward, and that buyers will have to pay higher prices. Whether this will be carried far enough to check consumption is another question.

For the reasons named, transactions in pig iron have been of comparatively moderate size. Makers are holding back and hesitating about naming prices. Buyers, on the other hand, are getting a little anxious, and are somewhat inclined to rush in headlong, as they often do on a rising market. Matters are, therefore, somewhat unsettled.

The billet pool and several of the other pools are holding meetings in New York this week, and there is little doubt that the outcome will be an advance of from $1.50 to $2 in bars and plates. Whether the structural pool will follow suit is doubtful, but the advance is most probable. It is understood that the rail pool will also meet shortly, with the object of fixing prices for next year. It is expected that the quotation of $28 per ton at mill for standard sections will be continued; but, of course, the assertion cannot be made positively until after the meeting. It is noticeable in all these meetings that an attempt is being made to keep matters quiet, and it is impossible to learn anything up to date as to the proceedings.

Upon the whole, the market may be considered as strong and advancing. A slight reaction, however, is possible when the present excitement settles down a little.

Pig Iron Production.—Statements from the blast furnaces show that on November 1 the capacity of the coke and anthracite furnaces in blast was 334,250 tons weekly, being 14,300 tons more than on October 1. Taking the estimates made by the *Iron Age*, and allowing for the output of the charcoal furnaces, we find that the production of pig iron in the United States for the 10 months ending October 31 was about 13,391,000 tons. Unsold stocks reported on November 1 were 529,000 tons, a decrease of 26,400 tons during October. These figures do not include iron held by the steel companies for their own use.

Trading in Pig Iron Warrants.—Trading in pig iron warrants began on the floor of the New York Produce Exchange on November 14. Under the rules adopted it is provided that the warrants issued by the American Pig Iron Storage Warrant Co. for pig iron stored under its system (and which are registered with the Central Trust Co.) may be deposited in the Farmers' Loan & Trust Co., which will then issue its certificates for the same. It is these certificates which will form the basis of trading on the exchange. When the purchaser of a certificate wishes the delivery to him of 100 tons of iron, consulting the latest daily bulletin on the exchange giving the brand, grade and location of all the iron covered by warrants held by the Farmers' Loan & Trust Co., he may select any 100 tons he chooses, and, surrendering the certificate to the Trust Co., will receive the warrant for the iron selected, stamped for issuance of delivery order, together with the amount of money originally deposited with said warrant. This delivery order for the iron covered by the warrant selected is immediately issued by the Warrant Co., and on presentation of the delivery order at the yard designated, the iron so selected will be loaded on railroad cars without charge.

Trading will be in lots of 100 tons. The following standard specifications have been adopted by the Produce Exchange committee:

It is recommended that all purchases be made by analysis.

In all contracts where pig iron is sold by chemical analysis, each carload, or its equivalent, shall be considered as a unit. At least one pig shall be selected at random from each four tons of every carload, and so as to fairly represent it. Drillings shall be taken so as to fairly represent the fracture surface of each pig, and the sample analyzed shall consist of an equal quantity of drillings from each pig, well mixed and ground before analysis. In case of disagreement between buyer and seller, an independent analyst, to be mutually agreed upon, shall be engaged to sample and analyze the iron. In this event, one pig shall be taken to represent every two tons. The cost of this sampling and analysis shall be borne by the buyer if the shipment is proven up to specifications, and by the seller if otherwise.

In all contracts, in the absence of a definite understanding to the contrary, a variation of 0.10% in silicon, either way, and of 0.01 in sulphur, above the standard, is allowed.

A deficiency of over 0.10% and up to 0.20% in the silicon subjects the shipment to a penalty of 4% of the contract price. An excess of 0.02 in the sulphur above the limit in these specifications subjects the shipment to rejection.

In the absence of specifications, the following numbers, known to the trade, shall represent the appended analysis for standard grades of foundry pig irons, irrespective of fracture, and subject to allowances and penalties as above:

Grade—	Silicon.	Sulphur (volumetric).	Sulphur (gravimetric).
No. 1.....	2.75	0.035	0.045
No. 2.....	2.25	0.045	0.055
No. 3.....	1.75	0.055	0.065
No. 4.....	1.25	0.065	0.075

New York deliveries are understood, and the committee has completed a list of differentials, representing the amount of money to be paid to the Farmers' Loan & Trust Co. with each kind of warrant, according to the location where delivery is required. In other words, dealings will be on the basis of pig iron delivered in New York harbor; if other delivery is required, the rates named in the differentials per ton must be added.

Birmingham. Nov. 14.

(*From Our Special Correspondent.*)

The Alabama pig iron manufacturers are receiving numerous inquiries as to conditions and capacities for delivery of iron, and there is a sharp demand for the product delivery during the first half of the coming year. Except at special prices, the furnacemen in this district are not anxious for business for immediate delivery. No. 2 foundry iron is being held firmly at $13 per ton, delivery during the first half of the coming year, and sales already made will aggregate nicely. The market is very active, and the prediction of $14 and $15 iron is reiterated. The production in this district could be better. The Tennessee Coal, Iron & Railroad Co. has six furnaces in operation, five at Ensley and one at Bessemer, with four of these making basic iron for the steel plant. The Sloss-Sheffield Steel & Iron Co. has five furnaces in operation. The Alabama Consolidated Coal & Iron Co. has three, the Republic Iron & Steel Co., two; Woodward Iron Co., two; Tutweiler, Alabama Steel & Wire Co., Lacey-Buek, Lookout, Mountain Iron Co., Central Iron Co., each one furnace. The Sloss-Sheffield Co. and the Republic Co. will each have a furnace ready for operation by the end of this week, while the statement is made that the Tennessee company will start up three furnaces at Bessemer shortly. The supplies of coal and coke are not yet sufficient to meet all demands.

There is a heavy local consumption within the Birmingham territory. Stocks of iron on hand with the consumers are beginning to diminish. Some have it that there is 100,000 tons of iron in the yards hereabouts, while others say that not half that amount could be found. Officials of the Sloss-Sheffield Steel & Iron Co. are authority for the statement that they have 50,000 tons of iron, if not more, which can be delivered on short notice.

All of the manufacturers in this district are asking $13 for No. 2 foundry iron, delivery next year. A sale of a few hundred tons at $13.50 was reported last week, but high authority, when asked, announced that the sale had not been heard of definitely. J. W. McQueen, second vice-president of the Sloss-Sheffield Steel & Iron Company, in answer to a question relative to the iron market, said: "No. 2 foundry at $13, delivery next year, is a fact. I would not swear to sales of No. 2 at $13.50."

The following schedule of quotations is given: No. 1 foundry, $13.50; No. 2 foundry, $13; No. 3 foundry, $12; No. 4 foundry, $11@$11.50; gray forge, $10.50; No. 1 soft, $13.50; No. 2 soft, $13.

Cast iron pipe works, rolling mills and steel plants in this section are requiring a large quantity of iron for their steady operation. As has been stated before, the activity among the steel industries and cast iron pipe works has never been better. The shipments of these products are on an extensive scale.

There is no change in conditions at the rolling mills. The Birmingham, Bessemer, Gate City and Sheffield rolling mills are all doing well.

Chicago. Nov. 15.

(*From Our Special Correspondent.*)

The local market for pig iron continues strong and with indications of a further rise in prices. Sales are running about the same as last week in aggregate volume, and are mostly of small to medium lots, though a tendency is noted to buy larger quantities, since election day. There was, however, little apprehension expressed by buyers or sellers over the political situation, and there are no marked changes in the market that can be attributed directly to the result. It is natural that the market should advance, and that buyers should make a rush for their iron, in the light of a strongly advancing market.

Quotations have not changed materially, No. 2 northern being worth, as last week, $15.50@$16, and No. 2 southern $12.50@$13.50 Birmingham, or $16.15@$17.15 Chicago. Most of the business is being done, as nearly as can be learned, at about $15.75 for northern and $12.50, Birmingham, for southern. At these figures the market is better for northern than for southern, and sales of northern are increasing more rapidly than those of southern pig.

Buyers continue to contract chiefly for the first quarter of 1905, and there is only a moderate demand for quick-delivery lots for December and January. It is probable that sellers will now be more willing than heretofore to contract for deliveries six to eight months ahead, and that the average time between contracts and deliveries will gradually increase. Buyers, however, have been running so closely to the wind that many of them are not supplied with iron for the first quarter of the coming year.

Coke is very firm and a trifle higher than last week, current quotations for Connellsville being $4.85@$4.95 per ton.

Cleveland. Nov. 15.

(*From Our Special Correspondent.*)

Iron Ore.—An unprecedented buying movement for so late in the year has occurred lately. As a result the heavy movement of the year will occur in October and November, the figures for the former period showing 4,000,000 tons brought down the lakes. The November figures will be equally important. These will establish new records for those months in lake history. Prices are not changed, being, on the non-bessemer ores, which are in demand, $2.60@$2.75 for old range and $2.40@$2.50 for mesabi. Lake carrying charges are unchanged at 75c. from Duluth. The total movement from the upper lake region will be 20,000,000 tons, necessitating a heavy movement even into December.

Finished Material.—The big demand for all lines of steel has stiffened prices, and now rumors are abroad of higher prices. More ship material has been bought, and bridge builders and general construction men are coming in to cover. This has strengthened the structural trade until producers are finding it necessary to scan orders carefully to keep down tendencies to speculate, leaving the books of the company unburdened with anything but orders on which specifications are likely. Plates have about the same tendency, the buying coming from boiler-makers, who have good business ahead. Bar buying has been strong, both for current needs and on contracts, and the price of bar iron has advanced; 1.35c. Youngstown being minimum, with 1.40c. asked. A good tonnage in bar steel is forthcoming from Cleveland concerns.

Pig Iron.—Buying of foundry has been unchecked and even seems to grow. Spot iron, which is scarce, has sold at $15.50 in the valleys for No. 2, and contracts are now being made for first half delivery at $15 in the valley, that price being minimum. Some of the new furnaces having contracted dangerously near their total output, and any lack of production would throw them behind with their orders, shipments are very heavy. There is a better demand, too, for bessemer, and some furnaces are now holding for $15.50 in the valleys, the

general run of prices, however, being $14.50@$15, with the latter favored. The basic producers are well sold up and are about off the market.

New York. Nov. 16.

Pig Iron.—A little dullness has developed in comparison with the activity of the past two or three weeks. The fact is that most of the local foundries and the New England foundries, which buy in this market, are pretty well supplied for the present quarter, and are rather holding off. Quotations, however, are high, and a considerable advance has been made recently. The furnaces supplying this market are asking much higher prices for future delivery. Northern iron has sold as high as $16.75 for No. 1 foundry, but probably supplies could be had for 25c. lower; No. 2X is $16@$16.25; No. 2 plain is held around $15.25@$15.75, and gray forge at $13.75@$14. Basic iron is higher, $15.50@$15.75 being asked for Virginia. Southern iron cotinues to be held at a high figure, with sellers apparently not anxious to do business at present. No 1 foundry, Southern, is quoted at $16.75 on dock, with no sales; for No. 2, $16.50 is asked; No. 3, $15.75, and No. 4, $15@$15.25; No. 1 soft, $16.75; No. 2 soft, $16.25; gray forge, $14.25.

The first sales of pig iron warrants on the Produce Exchange were made on Monday. The rules adopted for this kind of trading are given elsewhere. The first day's sales were light, amounting to 1,000 tons. The quotations varied from $16@$16.40 for November to $16.35@$16.80 for March delivery. There did not seem to be any rush to trade in iron warrants.

Bars.—The market is stronger, and the expected advance in prices has come. Quotations are 1.445@1.545, carload lots, Jersey City delivery. Soft steel bars are not in as good demand, but the quotation is the same as for iron. Store trade is not especially heavy, and prices are steady at 1.70@1.75, immediate delivery.

Plates.—Buying continues very fair, especially in small lots. We quote for tank plates, ¼ in., 1.545, in large lots, tidewater delivery. Flange and boiler plates are 1.645, same delivery.

Structural Material.—Business has been rather light and mainly in small lots. Quotations have been steady, at 1.55@1.65 for beams, angles and channels.

Steel Rails.—There is no change in quotations for standard sections, $28 per ton at mill still being the regular price. Very little business is doing here. Light rails are quite active, and prices continue at $21 per ton for 40-lb. rails at mill, and $24 for 16-lb. rails.

Scrap.—Old material is rather higher, and there is a considerable demand. Machinery cast brings $12.50@$13 per ton, local delivery. No. 1 railroad is scarce and prices variable. The great demand just now is for heavy steel melting scrap, sales having been made as high as $15, delivered.

Philadelphia. Nov. 15.

(*From Our Special Correspondent.*)

A panicky feeling seems to be taking possession of some of our pig iron consumers. The sudden advance in cost of production, due to higher priced ore and higher priced coke, as well as to the suddenly developed scarcity of pig iron for early delivery, has taken the market by surprise, especially as some of the heavy consumers of iron have undertaken to buy for delivery several months into next year. Pig iron of all grades has advanced somewhere between 50c. and $1 within two or three days, and yet to-day's quotations are difficult to give; all previous figures have been withdrawn, and buyers are endeavoring to close for supplies to carry them through this year at least." The situation is peculiar, and in some instances makers of iron who have pretty well sold up are refusing to name figures, as they do not desire to sell later deliveries until they can see their way clearer. No. 1 foundry iron is $16@$16.50; No. 2 foundry, $15.50@$16; gray forge, $13.50; basic iron, $15 at furnace; bessemer iron at Valley furnace, $14.50.

Bars.—The bar iron trade has suddenly improved in all quarters, and most of our smaller mills have suddenly filled up with business for the time being. The next move, the manufacturers think, will be to advance prices in order to equalize quotations with the increased cost of raw material; in fact, business has been taken this week at a premium above the usual quotations.

Billets.—The billet market is partaking of the same unsettled condition, and but little business has been done, owing to the unsettled prices and the unwillingness of manufacturers to accept orders for late delivery at present prices. The meeting to be held to-day in New York will clear the way for action and fix quotations on billets, sheets and tin-plate bars, which may be advanced to probably as much as $2.50 per ton. There is a good deal of business to be done as soon as the matter of price is settled.

Merchant Steel.—The agents of merchant steel mills are very busy these days taking care of their eastern trade, which has suddenly developed to quite large proportions. Prices have been advanced about 0.5c. a pound on some brands.

Pipes and Tubes.—The rush of work in engineering plants, car-building shops, machine shops, foundries and small shops of all kinds has led to a sharp demand not only for pipes and tubes, but for all manner of light iron and steel products which enter into the production of machinery. An advance has been made on early deliveries, and a reduction in discounts will be made in a few days.

Plates.—The very heavy orders which have been rushed into plate and structural mills has changed the face of the market entirely. Early deliveries cannot be had, excepting at a premium. The plate makers are welcoming all the business that comes along, but at prices which will protect them against the upward tendency in sight. The meeting of the plate and beam association in New York this week will determine the question of price, and as soon as the result is known a good deal of pending business will be closed.

Scrap.—The scrap market is in an excited condition over the exhaustion of material which is most wanted. Railroad scrap and heavy melting steel are in short supply, and quotations were given to-day at $17 for choice railroad scrap as a minimum, and $15 is asked for heavy melting steel.

Sheets.—Quite a run of orders was secured this week, and new business is steadily coming in for both light and heavy sheets, for early and remote delivery.

Steel Rails.—Announcements are made in railroad circles of intended purchases, and it is rumored here this week that some large orders have been sent into mills from western roads.

Structural Material.—A good demand has continued for beams, angles and channels, on a basis of 1.65c. A great deal of business is in sight.

Pittsburg. Nov. 15.

(*From Our Special Correspondent.*)

Interest this week is centered on the series of steel pool meetings scheduled to begin in New York to-day, opening with the Billet Association. These meetings will be of the so-called pools of billet, sheet bar, plate, structural material and steel bar interests. A meeting of wire makers, who have no organization, may be held also, and it is probable that the steel rail makers will get together and decide on the price for next year. There will be an adjustment of prices in some lines, and advances are expected, but not sufficient to choke off the buying movement. It is believed here that billets and sheet bars will be advanced about $2 a ton, and that prices for plates and structural material will not be disturbed. Announcement of an advance of $2 or $3 a ton in wire products was expected, and may be looked for at any time. A meeting is not necessary to do this, as the independent producers usually follow the action taken by the American Steel & Wire Co. It is possible, however, that other interests will be consulted before the announcement is made. For some time producers have limited shipment to the jobbing trade to 30 days, which was taken as an indication that prices were to be advanced. Many jobbers began to stock up immediately after the heavy cut made several weeks ago, feeling certain that the low prices would not continue long. The sheet market has developed considerable strength during the week, and mills are not booking much new business at the prevailing rate, as an advance is confidently expected. No business for next year at current prices has been accepted. A consumer asked an independent producer for a quotation on 3,000 tons for shipment in the first quarter, and although the price named was an advance of $3 a ton, it was accepted. No. 28 gauge black sheets have been quoted at 2.10c. for some time, and the new business was taken on a basis of 2.25c. A still higher price is expected for sheets after the first of the year. Tin-plate also is due for an advance. The American Sheet & Tin-Plate Co. cut the price of tin-plate several months ago to $3.30 a box for standard coke plates, and allowed a rebate of 5c. a box under certain conditions, but lately this was dispensed with, and the regular price was $3.25 a box. It is understood the price is soon to be increased to $3.40 or $3.45 a box. It is not generally known that the collections for the rebate fund from members of the Amalgamated Association of Iron, Steel & Tin Workers, which was discontinued on June 1, has been resumed. Instead of 3 per cent of the tin-plate worker's earnings, but 1½ per cent is collected under the new scale. The day after the election the American Co. received orders for tin-plate aggregating 50,000 boxes, and the orders since then have averaged about 30,000 boxes a day. It is understood that a large order for rebate tin-plate is under negotiation with packing interests, and may soon be closed. The Republic Iron & Steel Co. has just ordered an advance of $1 a ton for iron bars, the new rate being 1.40c., Youngstown. The bi-monthly examination of the sales sheets for September and October, to determine the wages of puddlers and finishers under the Amalgamated Association sliding scale for this month and December, showed the average selling price was 1.20c. Wages will remain at the base of $4.90 a ton for puddling. The Cambria Steel Co. took independent action on prices for steel bars, and has just announced an advance of $2 a ton. It is believed the steel bar pool will adopt this rate, putting bessemer bars at 1.40c., and open-hearth bars at 1.45c. There is considerable speculation as to the probable action of the steel rail pool on prices for 1905. The general opinion here seems to be that the present rate of $28 a ton will be continued for another year.

Pig iron prices continue to advance, and furnaces do not seem anxious to sell, evidently expecting a much higher market next year. The highest point reached by bessemer iron was yesterday, when a sale of 200 tons was made at $15, Valley furnace. Predictions are now made that the price for first quarter delivery will be above that figure. Last week a sale of 10,000 tons of bessemer was made at $14, Valley furnace, but the purchaser had an option, obtained some time before. The Republic Iron & Steel Co. to-day closed an option on 12,000 tons of bessemer at $14. The market for all grades of pig iron is much firmer. There is a scarcity, as many furnaces have sold up to the first of the year, and some have sold into the first quarter. It is reported here on excellent authority that, owing to the scarcity of coke and the limited ore supply, it would be an easy matter to corner the pig iron market, and that a movement is now on by some producers to obtain control of the market. Some independent steel mills will be affected by the movement. The Jones & Laughlin Steel Co., by extraordinary efforts, completed the work of re-lining furnace No. 2 of the Eliza group, and fires were started on Saturday. It will be producing pig iron inside of two weeks, when all of the furnaces of this company will be in blast, but not operating to full capacity, owing to the ore dust caused, which would be a violation of the injunction granted by the court.

Pig Iron.—The market is stronger, and indications point to further advances. A few small lots of bessemer were sold, in addition

to the order for 10,000 tons closed last week at $14, Valley, and the sale of 12,000 tons to the Republic Iron & Steel Co. Basic and foundry No. 2 for this year's delivery are quoted at $15.10@$15.35, Pittsburg, and for the first quarter about 25 or 50c. a ton more. Gray forge is firm at $13.85@$14.10, Pittsburg.

Steel.—Offers of the pool price of $19.50, Pittsburg, for bessemer and open-hearth billets have been refused during the week, and producers are holding off for a higher price. Steel bars are firmer, and quotations range from 1.30 to 1.40c. for bessemer, and 1.35 to 1.45c. for open-hearth. Plates are strong, at 1.30@1.40c.

Sheets.—The sheet market is very strong, and the leading interest is expected to advance prices. One sale was made at an advance over the current price. No. 28 gauge black sheets may now be quoted at 2.10@2.25c., and galvanized at 3.10@3.15c.

Ferro-Manganese.—The market shows some improvement, and domestic 80 per cent is quoted at $41@$42 per ton.

Cartagena, Spain. Oct. 29.

(*Special Report of Barrington & Holt.*)

Iron and Manganiferous Ores.—Shipments for the week were one cargo, 3,400 tons manganiferous ore, to Maryport; one cargo, 3,000 tons manganiferous ore, and one cargo, 2,700 tons magnetic ore, to Rotterdam. Conditions continue to improve, and sellers are asking a little higher prices for forward shipment, but no transactions have yet been made at the advance. Freight rates are slightly lower, latest quotation being 6s. 3d. Cartagena to Maryport.

For iron ore, quotations are as follows, f. o. b. Cartagena: Ordinary 50% ore, 6s.@6s. 3d.; special low phosphorus, 6s. 6d.@7s. 3d.; specular ore, 58%, 8s. 6d.; magnetic ore, 60%, 10s. 9d. for lumps, and 9s. for smalls. Campanile ore, 45% iron and carrying 10% lime, is quoted at 8s. 6d. Quotations vary from 9s. 3d. for 35% iron and 12% manganese, up to 14s. for 20% iron and 20% manganese.

Pyrite.—Iron pyrite, 40% iron and 43% sulphur, is quoted 10s. per ton. There is very little business doing.

CHEMICALS AND MINERALS.

(See Wholesale Prices-Current on page 816.)

New York, Nov. 16.

Business generally shows an improvement, and domestic prices have been strengthened by the firmer markets abroad. In a degree the higher ocean freights forecast continued steady prices for imported products, especially for 1905 delivery. An appreciably large business over next year is reported in domestic high-test alkali at 75@80c. per 100 lb., f. o. b. works, and in high-test caustic soda at $1.75@$1.80.

In raw materials, domestic brimstone is gaining steadily in its sales to the disadvantage of imported. The Union Sulphur Co., working the Louisiana mines, has just ordered another battery of boilers, aggregating 5,000 h. p., to double the output of sulphur. Numerous small orders have been booked for Scandinavia and Germany during the past month at prices appreciably higher than domestic deliveries.

Commenting on the situation in Sicilian sulphur, Messrs. Emil Fog & Sons, of Messina, under date of October 31, say that the exports from January to September, inclusive, amounted to 383,847 tons, against 359,266 tons last year. The Anglo-Sicilian Company owns about 80% of the stock and still controls the entire market. Regarding the Louisiana mines the Chambers of Commerce at Girgenti have petitioned the Italian government to make an official investigation. Owing to arrivals of brimstone from dissidents prices have declined. The difference in prices quoted by dissidents and the Anglo-Sicilian Co. is widening. We quote, per ton, f. o. b., as follows: Best unmixed seconds, in bulk, 80s. 6d.; ground, in bags, 88s. 6d.; best thirds, in bulk, 76s.; current thirds, 73s. 6d.; refined sulphur, 88s. 9d.@91s. 6d.; sublimed flowers, pure, in bags, 107s.; current, 99s. 3d.; commercial, 93s.; refined roll, 94s. 9d.; sticks, 100s. 3d.@106s. 6d. per ton.

Exports of sulphur from Sicily in September amounted to 25,063 tons—the smallest in several years—making a total for the nine months of 383,847 tons, which is an increase of 24,581 tons as compared with 1903. The exports to the United States for the nine months of this and last year were:

	1903.	1904.	Changes.
Best seconds	83,025	71,123	D. 11,902
Best thirds	26,021	16,074	D. 9,947
Total	109,046	87,197	D. 21 849

The decrease this year is equivalent to nearly 11 per cent, an indication that the domestic sulphur has grown in favor.

It is interesting to mention that the stocks of sulphur in Sicily on September 30 were 355,962 tons, showing a marked increase over previous years.

Nitrate of soda is unchanged, consumption being good and prices high. A charter of 2,817 tons—the *Alice A. Leigh*—has been booked from the west coast of South America to the United Kingdom at 20s. 9d. ($4.98), less 1s. 3d. (30c.) 1905 sailing.

The statistical position of nitrate of soda in Europe in the 10 months ending October 31 is shown below, in long tons:

	1903.	1904.	Changes.
Exports from S. Am.	850,865	885,306	I. 34,441
Imports	871,820	954,620	I. 82,800
Deliveries	1,033,190	1,008,100	D. 25,090
Loadings, S. Am., Nov. 1.	125,355	128,905	I. 3,550
Visible Supply., Nov. 1.	465,700	457,650	D. 8,050

Notable changes this year are the decrease of 2.4% in deliveries, and increase of 9% in imports.

The phosphate trade is in a healthy position, and shipments are seasonably large. In October the Peace River, Fla., shipments to domestic consumers amounted to 10,200 tons, making 71,640 tons for the 10 months this year.

Quotations for wholesale quantities are as below, f. o. b. New York, unless otherwise specified:

Brimstone,	Domestic 2ds, long ton	$21.45
	Domestic 99.5%, long ton. (For Baltimore and Phila. add 25c.; Portland, 15c.)	21.75
	Foreign 2ds, long ton	21.50
	Foreign 3ds, long ton	20.875
Pyrite, Am. 42@44%, lump, unit, at shipping port		10@10¼c.
	Am. fines, unit, at shipping port	8¼@9c.
	Spanish, 46@52%, lump, unit	10@11¼c.
	Spanish, fines, unit	9@10c.
Nitrate of soda, 95%, 100 lb.	spot	2.275
	shipments	2.20@2.275
96%, 100 lb.	spot	2.30
	shipments	2.225@2.30
Sulphate of ammonia, gas	spot	3.05
liquor, 100 lb.	shipments	3.07@3.10
Bleaching powder, prime, 100 lb		1.20@1.25
Cyanide, lb		19@20c.
Copper sulphate, 100 lb		4.875@5.00
Nitric acid, 36°, 100 lb.		4.50
38°, 100 lb.		4.75
40°, 100 lb.		5.00
42°, 100 lb.		5.25
Oxalic acid, com'l, 100 lb.		5.00@5.375
Sulphuric acid, 50°, bulk, ton		13.50@14.50
60°, 100 lb. in carboys		1.05
60°, bulk, ton		18.00@20.00
66°, 100 lb. in carboys		1.20
66°, bulk, ton		21.00@23.00
Phosphate, Fla. rock, 77@80%, f.o.b. shipping port		7.25@ 7.50
Fla. rock 77@80%, c.i.f. Europe		10.67@11.85
Fla. land pebble, 68@73%, f.o.b. shipping port		3.75@ 4.00
Fla. land pebble, 68@73%, c.i.f. Europe		7.70@ 8.40
Tenn. 78@80%, f.o.b. Mt. Pleasant		4.00@ 4.25
Tenn., c.i.f. Europe		10.27@10.67
Tenn., 78%, f.o.b.		3.75@ 4.00
Tenn., 75%, f.o.b.		3.25@ 3.50
So. Car., land rock, f.o.b. Ashley River		3.25@ 3.50
So. Car., river rock, f.o.b.		3 00@ 3.25
So. Car., river rock, c.i.f. Europe		6.33@ 6.56
Algerian, 63@70%, c.i.f.		7.04@ 7.71
Algerian, 58@63%, c.i.f.		6.15@ 6.60
Algerian, 53@58%, c.i.f.		5.05@ 5.20
Tunis, c.i.f.		6.15@ 6.60
Christmas isle, 80@85%, c.i.f.		13.20@14.03
Ocean isle, 88%, c.i.f.		13.60@14.45

Liverpool. Nov. 2.

(*Special Report of Joseph P. Brunner & Co.*)

Soda ash is well maintained. For tierces, the nearest values are about as follows: Leblanc ash, 48%, £5@£5 10s.; 58%, £5 10s.@£6. Ammonia ash, 48%, £4 5s.@£4 10s.; 58%, £4 10s.@£4 15s. per ton, net cash. Bags, 5s. per ton under price for tierces. Soda crystals meet with a fairly ready sale at generally £3 7s. 6d. per ton, less 5% for barrels, or 7s. less for bags, with special terms for a few favored markets. Caustic soda is firm, and makers are well sold. We quote: 60%, £8 15s.; 70%, £9 15s.; 74%, £10 5s.; 76%, £10 10s. per ton, net cash. Special quotations for the Continent and a few other export quarters.

Bleaching powder is in demand for home consumption, and there is rather more inquiry for export. For hardwood, £4 15s.@£5 per ton, net, cash, is about the range, as to market.

Chlorate of potash is quiet, at 3@3⅛d. per

Sulphate of ammonia is well held at £12 7s. 6d.@£12 10s. per ton, less 2½% for good gray 24@25% in double bags, f. o. b. here.

Nitrate of soda is again dearer, at £10 17s. 6d. per ton for ordinary, up to £11 2s. 6d. for best refined, in double bags, f. o. b. here, less 2½%.

METAL MARKET.

New York, Nov. 16.

Gold and Silver Exports and Imports.

At all United States Ports in October and year.

Metal.	October.		Year.	
	1903.	1904.	1903.	1904.
Gold:				
Exports	$352,177	$3,855,649	$41,889,028	$86,895,557
Imports	5,026,036	8,005,223	36,666,708	76,699,893
Excess	I. $4,673,859	I. $4,149,574	E. $5,222,320	E. $10,195,664
Silver:				
Exports	3,143,492	3,485,008	28,026,927	42,615,018
Imports	2,738,158	1,561,163	19,339,427	21,238,394
Excess	E. $405,334	E. $1,923,845	E. $8,687,500	E. $21,376,624

These figures include exports and imports at all United States ports; they are furnished by the Bureau of Statistics of the Department of Commerce and Labor.

Gold and Silver Exports and Imports, New York.

For the week ending November 12 and for years from January 1st.

Period.	Gold.		Silver.	
	Exports.	Imports.	Exports.	Imports.
Week	$2,007,200	$172,391	$518,570	$22,176
1904	83,812,181	5,718,213	31,907,930	926,520
1903	31,619,610	7,405,157	27,765,291	3,190,764
1902	24,759,532	3,512,044	22,732,058	1,040,381

The gold exported this week went chiefly to the West Indies; the silver to London. Imports were principally from Central America and the West Indies.

Gold exports have been resumed on a considerable scale after a suspension of two weeks, $3,750,000 having been taken for export to France so far this week. Exchange is very strong, and it seems probable that these shipments will be followed by others.

The statement of the New York banks—including the 56 banks represented in the Clearing House—for the week ending November 12, gives the following totals, comparisons being made with the corresponding week of 1903:

	1903.	1904.
Loans and discounts	$889,855,000	$1,125,089,900
Deposits	853,415,100	1,176,045,000
Circulation	45,983,000	42,313,900
Specie	156,441,800	226,558,700
Legal tenders	63,050,400	76,347,100
Total reserve	$219,492,200	$302,905,800
Legal requirements	213,353,775	294,011,250
Balance surplus	$6,138,425	$8,894,550

Changes for the week this year were decreases of $14,789,600 in loans and discounts, $20,107,400 in deposits, $271,300 in circulation, $4,741,100 in specie, $1,503,600 in legal tenders, and $1,217,850 in surplus reserve.

The following table shows the specie holdings of the leading banks of the world at the latest dates covered by their reports. The amounts are reduced to dollars, and comparison is made with the holdings at the corresponding date last year:

	1903.		1904.	
	Gold.	Silver.	Gold.	Silver.
N. Y. Ass'n	$156,441,800	.....	$226,558,700	.....
England	160,821,835	.....	169,034,380	.....
France	478,961,295	$220,470,420	523,519,430	$219,903,605
Germany	161,420,000	56,715,000	169,630,000	59,600,000
Spain	72,505,000	93,950,000	74,240,000	99,060,000
Netherlands	20,423,000	31,463,500	27,611,000	29,996,500
Belgium	16,450,000	8,225,000	16,643,335	8,321,665
Italy	103,630,000	12,055,000	110,480,000	15,112,000
Russia	390,040,000	33,965,000	491,550,000	34,960,000
Austria	232,240,000	60,330,000	243,360,000	99,060,000

The returns of the Associated Banks of New York are of date November 12, and the others November 10, as reported by the *Commercial and Financial Chronicle* cable. The New York banks do not report silver separately, but specie carried is chiefly gold. The Bank of England reports gold only.

The silver market has been very steady during the past week. Supplies have not been pressing on the market, and some outside orders have taken considerable metal. This has given more steadiness to a condition which might have been slightly downward in tendency.

The United States Assay Office in New York reports receipts of 53,500 oz. of silver for the week.

Shipments of silver from London to the East for the year up to November 3 are reported by Messrs. Pixley & Abell's circular as follows:

	1903.	1904.	Changes.
India	£5,394,130	£8,309,168 I.	£2,915,038
China	310,060	372,722 I.	62,662
Straits	721,879	58,103 D.	663,776
Totals	£6,426,069	£8,739,993 I.	£2,313,924

Receipts for the week this year were £145,000 in bar silver from New York, £4,000 from the West Indies, and £6,000 from Australia; total, £155,000. Shipments were £150,270 in bar silver to Bombay.

Indian exchange continues firm, although the demand for money in India is not as active as it has been. Nevertheless, the Council bills offered in London were all taken at an average of 16.06d. per rupee. The shipments of silver to India on private account continue fairly good. It is again reported that more silver will be taken for coinage, but no such orders have appeared on the market as yet.

Exports of merchandise from the United States in October are valued by the Bureau of Statistics of the Department of Commerce and Labor at $162,570,393, an increase of $28,308,716 over September. For the 10 months ending October 31, the statement is as follows:

	1903.	1904.
Exports	$1,149,664,479	$1,148,035,527
Imports	840,719,383	843,775,479
Excess, exports	$308,945,596	$304,260,048
Add excess of exports, silver		21,376,624
" " " " gold		10,195,664
Total export balance		$335,832,336

The gold and silver movement in detail will be found in the tables at the head of this column.

Prices of Foreign Coins.

	Bid.	Asked.
Mexican dollars	$0.46½	$0.47½
Peruvian soles and Chilean pesos	.42	.44
Victoria sovereigns	4.85	4.87
Twenty francs	3.87	3.90
Spanish 25 pesetas	4.78	4.82

OTHER METALS.

Daily Prices of Metals in New York.

November	Copper. Lake, Cts. per lb.	Copper. Electrolytic, Cts. per lb.	Copper. Cathodes, Cts. per lb.	Copper. London, £ per ton.	Tin. Cts. per lb.	Lead. Cts. per lb.	Spelter. New York, Cts. per lb.	Spelter. St. Louis, Cts. per lb.
10	14 @14¼	13⅞ @14	13⅜ @13⅞	64½	28½	4.20	5.40	5.25
11	14¼ " 14½	13⅞ " 14	13⅜ " 13⅞	64½	28½	4.20	5.40	5.25
12	14¼ " 14½	14 " 14¼	13⅜ " 14	....	28½	4.20	5.45	5.30
14	14¼ " 14½	14¼ " 14⅜	13⅞ " 14⅛	65½	29	4.20	5.50	5.35
15	14⅜ " 14½	14¼ " 14½	14 " 14¼	66½	29	4.20	5.50	5.35
16	14⅜ " 14½	14¼ " 14½	14 " 14¼	65½ @29½	29	4.20	5.50 @5.52½	5.35 5.37½

London quotations are per long ton (2,240 lb.) standard copper, which is now the equivalent of the former g. m. b's. The New York quotations for electrolytic copper are for cakes, ingots or wire-bars.

SILVER AND STERLING EXCHANGE.

November.	Sterling Exchange.	Silver. New York, Cents.	Silver. London, Pence.	November.	Sterling Exchange.	Silver. New York, Cents.	Silver. London, Pence.
10	4.86½	58⅛	26⅞	14	4.86½	58⅛	26⅞
11	4.86½	58⅛	26⅞	15	4.86⅝	58⅛	26⅞
12	4.86½	58⅛	26⅞	16	4.86⅝	58⅛	26⅞

New York quotations are for fine silver, per ounce Troy. London prices are for sterling silver .925 fine.

Copper.—During the week under review, the market has again displayed considerable strength. Consumption remains very satisfactory indeed, but producers have been rather reluctant sellers. The closing quotations are given as 14⅜@14⅝c. for Lake copper; 14¼@14½c. for electrolytic copper in ingots, cakes and wirebars, 14@14¼c. in cathodes; 14@14¼c. for casting copper.

The market for standard copper in London, which closed last week at £64 12s. 6d., opened on Monday at £65 10s., advanced on Tuesday to £66 2s. 6d., but owing to political troubles declined again on Wednesday upon the realization of speculative holdings, and the closing quotations are cabled as £65 10s.@£65 11s. 3d. for spot, £66 2s. 6d.@£66 3s. 9d. for three months.

Statistics for the first half of November show an increase in the visible supplies of 900 tons.

Refined and manufactured sorts we quote: English tough, £68 10s.@£69; best selected, £69 10s.@£70; strong sheets, £78@£79; India sheets, £75@£76; yellow metal, 6⅜@6½d.

Exports of copper from New York and Baltimore for the week ending November 15 were 2,157 long tons. Imports for the week of November 11 were 2 tons copper and $34.223 worth of ore, quantity not given.

Tin has ruled quiet but steady throughout the week, and prices have followed closely the ups and downs of the market in London. There has been a fair consumptive demand. The closing quotations are given as 29@29⅛c. for spot, 28⅞@29c. for futures.

The foreign market, which closed last week at £132, opened on Monday at the same price, advanced on Tuesday to £132 10s., and the closing quotations on Wednesday are cabled as £132 7s. 6d.@£132 10s. for spot, £132 7s. 6d. @£132 10s. for three months.

Lead remains quiet but strong, without any special feature. The ruling quotations are 4.20c. New York, 4.125c. St. Louis.

The foreign market is dull, Spanish lead being quoted at £13, English lead £13 2s. 6d.

St. Louis Lead Market.—The John Wahl Commission Co. telegraphs us as follows: Lead is strong and higher. The latest sales reported are on a basis of 4.35c. East St. Louis.

Spelter has been in good demand, and in view of the higher prices asked for ore, producers have again raised their views. The closing quotations are 5.35@5.375c. St. Louis, 5.50@5.525c. New York.

The foreign market is strong, good ordinaries being quoted at £24 15s.@£25, specials £25@£25 5s.

St. Louis Spelter Market.—The John Wahl Commission Co. telegraphs us as follows: Spelter is unsettled, and it is difficult to give accurate quotations. Prices rule in the ascendant daily. The latest sales reported are on a basis of 5.40c. East St. Louis.

Spanish Lead Market.—Messrs. Barrington & Holt report from Cartagena, Spain, under date of October 29, that the price of silver has been 14.75 reales per oz. Exchange is slightly lower at 34.41 pesetas to £1. Local quotations for pig lead have been 69.25 reales per quintal, which, on current exchange, is equal to £11 5s. 3d. per long ton, f. o. b. Cartagena. Exports for the week were 1,000,000 kg. desilverized and 504,519 kg. argentiferous lead to London; 327,102 kg. argentiferous, 64,000 kg. desilverized lead, and 1,237 kg. silver bars to Marseilles.

Antimony continues to display considerable strength, though the demand is nothing out of the ordinary. The closing quotations are given as 7¾@7⅞c. for Cookson's, 7½@7⅝c. for Hallett's, 7⅜@7½c. for Hungarian, U. S., Italian, French, Japanese and Chinese.

Nickel.—The price is quoted by leading producers at 40@47c. per lb. for large quantities down to ton lots, according to size and terms of order. The price for smaller lots, according to quantity, runs as high as 60c. per pound.

Platinum.—Quotations are higher, at $19.50 per ounce.

Platinum in manufactured forms is higher. Messrs. Eimer & Amend, of New York, quote for different forms, as follows: Heavy sheet and rod, 72c. per gram; foil and wire, 74c.; crucibles and dishes, 78c.; perforated ware, 85c., and cones, $1 per gram.

Quicksilver.—Prices are low. In New York large lots have been offered at $40 per flask (75 lb.), with $41@$42 quoted for smaller orders. The San Francisco price is now $41.50 @$42. London price is £7 15s., with the same quotations from second-hands.

Minor Metals and Alloys.—Thallium is quoted at 60@65 marks per kg. at Breslau, Germany. Manganese metal is quoted at 360 marks per 100 kg., f. o. b. Bremen, Germany. Manganese tin alloy, 55%, is quoted 365 marks per 100 kg. for first quality and 225 marks for second quality, both f. o. b. Bremen.

For other minor metals and their alloys, wholesale prices, f. o. b. works, are as follows:

	Per lb.		Per lb.
Aluminum.		Ferro-Chrom. (74%)	12½c.
No. 1. 99% ingots	33@37c	Ferro-Tungsten (37%)	45c.
No. 2. 99% ingots	31@34c	Magnesium, pure	
Rolled Sheets	4c. up	(N. Y.)	$1.60
Alum-bronze	20@23c.	Manganese, (98@99%	
Nickel-alum	33@39c.	N. Y.)	75c.
Bismuth	$2.10	Manganese, Cu., (30@70%	
Chr'm'm, pure (N.Y.)	80c.	N. Y.)	40c.
Copper, red oxide	50c.	Molybdenum, (98@99%	
Fe.-Molybd'm (50%)	$1.00	N. Y.)	$2.75
Ferro-Titanium (20@25%		Phosphorus, foreign	45c.
N. Y.)	75c.	Phosphurus, American	70c.
Ferro-Vanadium, (25%		Sodium metal	50c.
N. Y.)	$3.00	Tungsten (best)	$1.25

Differences in price depend chiefly upon size and conditions of order.

Missouri Ore Market. Nov. 12.

(*From Our Special Correspondent.*)

The highest price paid for zinc ore this week was $50 per ton, an advance of $4 per ton over the highest price last week, and this advance was on five bins of zinc concentrate, and made by the purchasing agents of four different smelting companies. Not only this, but a large tonnage of ore sold at $49.50 per ton. Some ore was advanced $10 per ton, so intense was the competition to secure a supply from the limited output of the mines. For two weeks the Edgar Zinc Co. endeavored to buy ore on a $38 basis, prior to this week, but other smelters went above that price, and the Edgar company secured very little ore, only about half its need. In an endeavor to again secure a proportion of the output, the purchasing agents of this company were forced to raise the prices offered by other buyers, but the other companies did not want to let go of any regular supplies. The result was lively competitive bidding on all grades, best and medium, of zinc ore. The assay basis reached $44@$48 per ton, of 60 per cent zinc. Lead ore continued firm, at $54 per ton.

Following are the shipments of zinc and lead ore from the various camps of the Joplin district for the week:

	Zinc lb.	Lead lb.	Value.
Joplin	3,026,250	289,200	$74,580
Webb City-Carterville	2,619,620	447,940	66,880
Galena-Empire	1,005,380	167,760	37,340
Alba-Neck	977,530	50,690	23,850
Duenweg	686,090	60,310	16,720
Badger	439,670	11,440	10,860
Aurora	496,270	8,570	7,120
Oronogo	247,200	10,990	5,510
Prosperity	188,620	50,480	5,510
Granby	420,480	27,500	5,470
Zincite	246,600	9,760	5,440
Carthage	167,780	.....	3,860
Baxter	53,450	48,370	2,330
Sherwood	99,950	7,240	2,290
Spurgeon	87,740	.....	1,750
Beef Branch	94,490	25,920	1,460
Diamond	64,720	.....	1,360
Moseley	42,270	.....	840
Totals	10,964,110	1,216,170	$273,170
46 weeks	459,100,280	58,168,140	$9,534,570
Zinc value, the week,	$238,850;	46 weeks,	$7,939,130
Lead value, the week,	34,320;	46 weeks,	1,595,440

Average Prices of Metals per lb., New York.

Mo.	Tin.		Lead.		Spelter.	
	1903.	1904.	1903.	1904.	1903.	1904.
Jan ...	28.33	28.845	4.075	4.347	4.865	4.863
Feb ...	29.43	28.087	4.075	4.375	5.043	4.916
Mar...	30.15	28.317	4.442	4.475	5.349	5.057
April ..	29.81	28.132	4.567	4.475	5.550	5.219
May...	29.51	27.718	4.325	4.423	5.639	5.031
June ..	28.34	26.325	4.210	4.196	5.697	4.760
July...	27.68	26.573	4.075	4.192	5.662	4.873
Aug. ..	28.29	27.012	4.075	4.111	5.725	4.866
Sept ..	26.77	27.780	4.243	4.200	5.686	5.046
Oct ...	25.92	28.596	4.375	4.200	5.510	5.181
Nov. ..	25.42	.....	4.218	.....	5.038	.....
Dec ...	27.41	.....	4.162	.....	4.731	.....
Year..	28.09	.....	4.237	.....	5.400	.....

NOTE.—The average price of spelter in St. Louis for the month of January, 1904, was 4.673c. per lb.; February, 4.717c.; March, 4.841c.; April, 5.038c.; May, 4.853c.; June, 4.596c.; July, 4.723c.; August, 4.716c; September, 4.896c; October, 5.033c.

Average Prices of Copper.

Mo.	New York.				London.	
	Electrolytic.		Lake.		Standard.	
	1903.	1904.	1903.	1904.	1903.	1904.
Jan ..	12.159	12.410	12.361	12.553	53.52	57.500
Feb. .	12.778	12.063	12.901	12.245	57.34	56.500
Mar. .	14.416	12.299	14.572	12.551	63.85	57.321
April .	14.454	12.923	14.642	13.120	61.72	58.247
May..	14.435	12.758	14.618	13.000	61.73	57.321
June .	13.942	12.269	14.212	12.399	57.30	56.398
July..	13.094	12.380	13.341	12.505	56.64	57.256
Aug. .	12.962	12.343	13.159	12.468	58.44	56.952
Sept .	13.205	12.495	13.345	12.620	56 82	57.645
Oct ..	12 801	12.993	12.954	13.118	55.60	60.012
Nov. .	12,617	.....	12.813	.....	56.30	.....
Dec ..	11,952	.....	12,084	.....	56.36	.....
Year..	13.235	.....	13.417	.....	57.97	.....

New York prices are in cents, per pound; London prices in pounds sterling, per long ton of 2,240 lbs., standard copper. The prices for electrolytic copper are for cakes, ingots or wire bars; prices of cathodes are usually 0.25 cent lower.

Average Prices of Silver, per ounce Troy.

Mo.	1902.		1903.		1904.	
	London, Pence.	N. Y., Cents.	London, Pence.	N. Y., Cents.	London, Pence.	N. Y Cents.
Jan ..	25.62	55.56	21.98	47.57	26.423	57.055
Feb ..	25.41	55.09	22.11	47.89	26.665	57.592
Mar...	25.00	54.23	22.49	48.72	26.164	56.741
April.	24.34	52.72	23.38	50.56	24.974	54.202
May..	23.71	51.31	24.89	54.11	25.578	55.430
June ..	24.17	52.36	24.29	52.86	25.644	55.672
July..	24.38	52.88	24.86	53.92	26.760	58.095
Aug. ..	24.23	52.52	25.63	55.36	26.591	57.806
Sept ..	23.88	51.52	26.75	58.00	26.349	57.120
Oct ...	23.40	50.57	27.89	60.36	26.760	57.923
Nov. ..	22.70	49.07	27.01	58.11	.....	.....
Dec ...	22.21	48.03	25.73	55.375	.....	.....
Year...	24.09	52.16	24.75	53.57	.....	.....

The New York prices are per fine ounce; the London quotation is per standard ounce, .925 fine

DIVIDENDS.

Company.	Payable.	Rate.	Amount.
†Alma Oil, Cal.	Nov. 1	.03	12,000
†Amalgamated C	Nov. 28	.50	760,420
‡Anaconda Copper	Nov. 18	.50	600,000
*Bartolome de Medina	Nov. 30	.70	1,395
*Central Lead	Nov. 28	.50	5,000
*Homestake, S. D.	Nov. 25	.25	54,600
*Illinois Crude Oil.	Nov. 25	.01½	2,500
*Kendall, Mont.	Nov. 20	.10	50,000
*Lightner, Cal.	Nov. 20	.05	6,250
‡Mexican Coal & C	Dec. 1	3.00	150,000
*Mines Co. of Am	Nov. 20	.01½	30,000
†National Lead, pf	Dec. 15	1.75	260,820
*N. Y. & Hond.-Ros.	Nov. 19	.10	15,000
*Pacific Coast Borax	Nov. 29	1.00	19,000
*Penna., Cal	Nov. 15	.10	5,150
†Sovereign Oil, Cal	Nov. 15	.01½	6,250
†Sterling Oil, Cal.	Nov. 15	.07	17,500
†U. S. Steel Corp., pf.	Nov. 30	1.75	6,304,919
Waldorf, Colo	Nov. 1	.005	15,000

*Monthly. †Quarterly. ‡Semi-annual.

ASSESSMENTS.

Company.	Delinq.	Sale.	Amt.
Alta, Nev.	Nov. 12	Nov. 30	.05
Best & Belcher	Nov. 4	Nov. 25	.10
Bonanza, Utah	Nov. 21	Dec. 8	.04
Bullion, Nev	Nov. 11	Dec. 1	.05
Caledonia, Nev	Nov. 21	Dec. 12	.10
Con. Cal. & Va.	Oct. 31	Nov. 21	.25
Con. Imperial, Nev.	Dec. 6	Jan. 4	.01
Crown Point, Nev.	Nov. 9	Dec. 1	.10
Exchequer, Nev	Nov. 28	Dec. 20	.05
Fremont Con., Cal.	Nov. 30	.....	.25
Gould & Curry	Nov. 25	Dec. 14	.10
Hale & Norcross	Oct. 31	Nov. 30	.10
Julia Con., Nev.	Dec. 8	.....	.03
Justice, Nev	Dec. 5	Dec. 23	.05
Potosi, Nev	Nov. 22	Dec. 13	.10
Red Slide, Cal	Nov. 12	Nov. 30	.05
S. Nevada, Nev.	Nov. 17	Dec. 7	.10
Socrates Con., Cal.	Dec. 2	.....	.01
South Eureka, Cal.	Nov. 19	.....	.02
Susannah, Utah.	Nov. 11	Nov. 28	.005
Union Con., Nev.	Nov. 9	Nov 29	.10
Wabash, Utah.	Nov. 24	Dec. 15	.05

NEW YORK.

Company.	Par val.	Nov. 9		Nov. 10		Nov. 11		Nov. 12		Nov. 14		Nov. 15		Sales.
		H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	
Alice	25	.62												200
Amalgamated, C.	100	74½	72½	74½	73½	75	73½	75	74½	75½	74½	76½	75½	331,300
Anaconda	25	105	....	109½	106	111½	109	115½	114½	115½	114	120	117	10,100
Andes	1	....	....	....	....	.25	....	....	....	....	....	....	....	300
Brunswick	1	....	....	....	....	.11	....	....	....	....	....	....	....	200
Caledonia	1	....	....	.35	....	....	....	....	....	....	....	....	....	400
Chollar	2½	.17	.16	....	....	....	....	....	....	.14	....	....	....	2,300
Chrysolite	50	.05	....	....	....	....	....	....	....	.05	....	....	....	600
C. K., & N.	1	....	....	.19	....	....	....	....	....	....	....	....	....	500
Con. Cal. & Va.	2½	1.70	....	....	....	1.70	....	1.55	....	1.65	....	1.70	1.65	1,000
Creede&Cripple Ck	1	....	....	.09	....	....	....	....	....	....	....	....	....	500
Cripple Creek Con.	1	.09	....	.09	....	....	....	....	....	.09	....	.09	....	6,000
Crown Point.	1	....	....	....	....	....	....	.12	....	....	....	....	....	200
Daly	20	....	....	1.90	....	....	....	....	....	....	....	....	....	10
Elkton Con	1	....	....	.66	....	....	....	.65	....	....	....	.64	....	1,000
Federal Mg. & Sm.	50	....	....	45	43½	45	....	....	....	46	....	47½	47	1,295
Preferred	50	....	....	90	....	82	....	82	80	79½	78	....	....	1,900
Gold Dollar.	1	.06	....	....	....	....	....	.06	....	....	....	....	....	2,000
Greene Con.	10	25½	23½	25	24½	25	24	25½	24½	25½	24½	25½	24½	31,150
Hale & Norcross.	3	....	....	.70	....	....	....	.65	....	....	....	.63	....	800
Homestake.	100	....	....	....	....	....	....	....	....	....	....	....	....	....
Horn Silver	20	1.65	....	....	....	1.60	....	....	....	1.65	1.60	....	....	1,300
Isabella.	1	....	....	....	....	.21	....	....	....	.20	....	....	....	1,000
Jack Pot	1	....	....	.05	....	....	....	....	....	....	....	....	....	500
Julia.	1	....	....	....	....	....	....	.05	....	....	....	....	....	300
Little Chief.	50	....	....	....	....	....	....	....	....	.05	....	....	....	300
Mexican	3	....	....	1.15	....	....	....	....	....	....	....	....	....	100
Mollie Gibson	5	.03½	....	....	....	.03½	....	....	....	....	....	.04	.03½	3,000
Moon Anchor	5	....	....	.07	....	....	....	....	....	.07	....	....	....	1,000
Old Gold	1	....	....	....	....	.10	....	....	....	....	....	....	....	500
Ontario	100	....	....	....	....	3.75	....	....	....	....	....	....	....	20
Ophir	3	2.50	....	....	....	2.25	2.20	2.00	....	2.15	2.10	2.05	....	1,100
Pharmacist	1	.03½	....	....	....	....	....	....	....	....	....	....	....	2,000
Phœnix	1	....	....	.16	....	.16	....	.16	....	.16	....	.17	....	3,700
Portland	1	1.75	....	1.75	....	1.95	....	1.65	....	1.65	....	....	....	1,300
Potosi	1	....	....	.10	....	.09	.08	....	....	.09	....	.08	....	800
Quicksilver	100	....	....	....	....	....	....	....	....	1½	1½	3½	1½	9,025
Quicksilver pf.	100	....	....	....	....	3½	....	....	....	5½	4	6½	5½	2,500
Savage	3	.25	....	.25	....	.26	....	....	....	.24	....	....	....	1,300
Sierra Nevada	3	....	....	....	....	.25	....	....	....	....	....	....	....	100
Silver Hill.	1	....	....	....	....	.53	....	....	....	....	....	....	....	200
Small Hopes	20	....	....	.33	....	.33	....	....	....	.32	....	....	....	700
Tennessee C.	25	....	....	35½	32	36	35½	36½	35½	37	36½	37½	36½	17,500
Union Copper.	10	½	....	½	....	½	....	....	....	1	1/16	1½	1	5,700
United Copper	100	....	....	7½	....	7½	7	7½	7½	10	9	11	10½	3,800
United Cop. pf.	100	....	....	....	....	.58	....	....	....	....	....	.64	.63	300
White Knob.	10	½	....	½	....	½	....	½	....	....	....	½	½	3,650
Work	1	.08	....	....	....	....	....	....	....	.07	....	.07	....	4,500

Total sales, 458,250 shares.

SALT LAKE CITY.*

Nov. 12

Company	Par Val	Low.	High.	Sales.	Company.	Par Val	Low.	High.	Sales.
Ajax	$ 1	.11	.11	100	N. Y. Bonanza	$1	.13½	.16	48,600
Butler-Liberal	1	.10½	.11½	9,700	Sacramento	5	.10	.11	2,000
Beck Tunnel Con	1	.06	.06	5,000	Silver Shield	1	.11	.13½	10,561
Carisa	1	.14½	.21	26,700	Star Con.	1	.15	.15	500
Con. Mercur	5	.42	.43½	1,825	Tetro.	1	.22	.24½	3,500
Columbus Con	1	1.28	1.40	300	Uncle Sam Con.	1	.22½	.23½	2,000
Daly-West.	20	11.17½	12.25	1,205½	Utah	1	.50	.50	100
Eagle & Blue Bell.	1	.01½	.03	31,500	Victoria	1	2.00	2.05	1,000
Little Chief	1	.90	.90	100	Victor Con.	1	.04	.04½	4,500
Lower Mammoth	1	.13½	.15	4,700	Wabash	1	.22	.24	1,000
May Day.	1	.32	.33½	19,500	Yankee Con.	1	.35	.35	400

*By our Special Correspondent. Total sales, 174,791½ shares.

BOSTON, MASS.

Company.	Par val.	Nov. 9		Nov. 10		Nov. 11		Nov. 12		Nov. 14		Nov. 15		Sales.
		H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	
Adventure Con	$25	7	6½	7⅞	7¼	7⅞	7⅝	7⅞	7	7⅞	7¼	7⅞	7¼	3,865
Allouez	25	15½	14½	17	15⅝	19½	17½	19½	18⅞	20½	18¾	21	19¼	48 062
Amalgamated	100	74¼	73	74¼	73	74¾	74	75	74½	75⅞	74½	76⅛	75	46,626
Am. Z. L. & Sm.	25	14	13¾	13⅝	....	13½	13¼	13⅝	....	13¾	13	13½	....	885
Anaconda	25	25⅞	....	27⅞	....	27⅝	....	28	....	28¼	28⅛	28	....	680
Arcadian	25	1½	1¼	2½	2¼	2⅝	2½	2⅝	2½	3	2½	3	2¼	6,820
Arnold	25	.95	.85	1.00	.90	1.00	.95	1.00	....	1¼	1	1	1¼	5,555
Atlantic	25	17½	16¾	19½	17½	21	19¼	22½	20½	21⅝	20½	21½	20¼	30,545
Bingham Con.	50	34	33½	34⅜	34	36	34⅜	36½	35½	36½	35½	36⅜	36	18,323
Bonanza	10	....	....	.67	.55	.80	.70	1.00	.85	1.00	.95	1 1/16	1	13,630
Boston Con.	5	6¾	6½	7	6¾	7¼	7	7¼	7	7¼	7	7¼	7	20,340
Calumet & Hecla	25	625	....	630	....	640	....	655	650	665	660	675	665	148
Catalpa	10	....	....	....	....	.09	....	....	....	.09	....	.09	....	1,800
Centennial	25	29½	29	31½	29¾	33	31	32½	31¾	32½	31½	32	30½	27,887
Con. Mercur	5	.45	....	.45	....	.45	....	.45	....	.50	49	50	....	3,175
Copper Range	100	66¾	65½	67½	66½	69¾	67	72½	70¾	72½	70¾	72½	71½	45,833
Daly-West	20	12½	12¼	†12½	11¼	12½	11½	12	11¼	12½	11¼	14½	12½	3,638
Dominion C.	100	60½	60	....	....	63	60½	65½	63½	....	....	64½	....	1,210
Dominion C. pf.	100	....	....	....	....	....	....	....	....	....	....	....	....	....
Dominion I. & S.	100	17	16¾	16½	16¼	18	16½	20	18½	19¾	18⅝	19¾	18½	5,185
Elm River	12	3⅜	3½	3⅜	3⅜	3¾	3⅝	4	3¾	4	3⅝	4	3½	2,510
Franklin	25	13	12½	14	12½	15	13½	15½	13	15½	15	15½	14½	8,483
Granby Con.	10	4	3½	4	3⅝	4	3½	4	3½	4¼	4	4¼	4¼	39,338
Greene Con. C	10	25⅜	23¾	25	24½	25½	24½	25½	24½	25½	24¾	25½	25	18,134
Guanajuato Con.	5	2½	2¼	3⅛	2½	2¾	2⅜	2¾	2½	3	2½	3	2⅜	6,880
Humboldt	25	1¾	....	....	....	1½	1	1	.95	1½	1	1½	....	1,750
Isle Royal Con.	25	29½	26½	34¼	29½	35½	34	34½	31	32½	30	31½	30½	31,752
Mass. Con.	25	7	6¾	7	6¾	7	6¾	8	7	8¼	7½	8	7¾	6,855
Mayflower	25	1½	1	1½	1¼	1½	1⅜	2	1⅜	2	1⅜	1½	1⅜	4,820
Michigan.	25	10½	9¾	10	9¾	10½	9¾	10⅜	10½	11	10½	10⅜	10½	4,229
Mohawk	25	54½	53½	55	54	56	54½	56	55½	56	54½	55½	55	11,722
Mont. Coal & C.	25	5	....	5	4¾	5	4¾	5	....	5	4¾	....	....	6,110
Old Colony.	25	....	....	2	1½	....	....	2½	2	2½	2	2½	....	3,295
Old Dominion	25	27½	26½	28¾	27½	28½	27⅝	28½	27½	27⅞	27	27½	27	7,275
Osceola	25	92½	91	93½	92½	96	93½	96	95	95½	95	96	95	4,556
Parrot.	10	29¾	28¾	30	29½	30½	29½	31	30½	33	31	32½	32	6,391
Phœnix Con.	25	2½	1	3½	2½	5	3⅜	5	4½	4½	4	4½	4½	4,137
Quincy	25	109	108	110	109	115	110½	115	....	115	....	119	116	850
Rhode Island.	25	2	1½	2½	2	3	2½	3	....	....	....	2½	2½	2,385
Santa Fe.	10	2½	2½	2½	2½	3	2½	3½	2½	3½	2½	3½	3	16,915
Shannon	10	8½	8½	8½	8⅜	8½	8½	8⅝	8	8½	8	8⅝	8½	22,110
Tamarack.	25	135	129	140	135	140	139	140	139	139	138	139½	138	1,105
Tecumseh	25	....	....	2½	....	2½	....	2½	....	2½	....	2½	....	1,095
Tennessee	25	....	....	35	34	....	....	35½	....	....	....	....	....	1,100
Trinity	25	16½	15	16½	16	17½	16	18½	17½	18	16½	17½	16½	37,404
Union C. L'd & Mg	25	4½	....	4½	4½	....	....	4½	....	4½	....	....	....	1,437
United States.	10	23½	23	24½	23	24½	24	25	24⅜	25½	24½	25	24½	32,139
U.S.Coal & Oil.	25	10½	10½	10½	10	10½	10	11	10½	10⅝	10½	11⅛	10½	4,860
Utah Con	5	44	43½	44½	43½	44½	43¾	44	44	45	44½	45½	45	23,381
Victoria.	25	5½	4½	5½	5½	6½	5½	6½	6	6½	6½	6½	6	8,606
Washington.	25	.40c	....	.50	....	.50	....	1.00	.50	.75	50	.75	....	1,535
Winona.	25	11½	11	12	11	12½	11½	13½	12½	13	12½	12½	12½	15,858
Wolverine.	25	101	100	104	100½	105	104	105	103	107	105	107½	107	898
Wyandot	25	3	2½	2½	2½	2½	2½	3	2½	3	2½	3	2⅜	2,690

†Ex-dividend.

COAL, IRON AND INDUSTRIAL STOCKS.

Company.	Par val.	Nov. 9		Nov. 10		Nov. 11		Nov. 12		Nov. 14		Nov. 15		Sales.
		H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	
Allis-Chalmers	$100	14½	14	13½	....	14	13½	14	....	16½	14½	16⅞	16	11,981
Allis-Chalmers pf.	100	....	....	....	....	....	....	....	....	61½	57	61	....	800
Am. Agri. Chem	100	....	....	....	....	....	....	....	....	....	....	....	....	....
Am. Sm. & Ref.	100	76¾	75½	76	75½	77	74¾	78	77	78¾	77¼	79½	78¾	95,410
Preferred	100	112½	112	112½	....	112½	....	113½	113	114½	114	115	113½	4,176
†Cambria Iron	50	47	....	47	....	....	....	....	....	....	....	47	....	221
†Cambria Steel	50	25	24½	24⅝	24½	25	24⅛	25¼	24½	....	....	25⅜	24½	13,630
Col. Fuel & Iron	100	44	42½	44	42½	47⅜	44	47½	46½	47¼	45½	47½	46½	169,085
Col. Fuel & Iron pf	100	82	....	....	....	85	84	....	....	86	....	....	....	400
Col. & H. C. & I.	100	14½	....	15	14½	16½	14½	16½	16½	16½	16½	16½	16½	7,900
General Chem. pf.	....	....	....	....	....	....	....	....	....	....	....	96½	....	100
†Lehigh C. & N.	50	94	93	87½	87	87½	87	86½	....	....	....	87½	86½	3,188
*Mong. R. Coal	50	....	....	10¾	....	....	....	....	....	....	....	11	10	363
*Mong. R. Coal pf.	50	26	25	27½	26	28½	27½	28½	27¾	....	....	30	29	2,220
National Lead	100	25½	24½	24½	24½	25	24½	25	24½	26	25	25½	25	13,000
Preferred	100	....	....	97	....	....	....	97½	97	98	....	98	97½	700
Phila. Nat. Gas.	50	41½	41	41½	41	41½	41	41	39½	....	....	40½	40	15,373
Preferred	50	46½	....	46½	....	....	....	....	....	....	....	45½	45	701
*Pittsburg Coal	100	17½	17¼	17½	....	17½	17¼	17⅜	....	....	....	21½	20¼	4,612
Preferred	100	77	76	77½	76½	77¼	76½	77½	77	....	....	79½	78½	6,244
Republic I. & S.	100	17½	15½	16⅜	16½	16⅜	16½	16½	16½	17½	16⅜	17	16½	32,200
Preferred	100	64	61½	63½	62½	63	62½	64	63	63½	63	64½	63½	14,985
Sloss-Shef. S. & I.	100	58½	57½	61½	57½	65½	62½	64	61½	64	60½	63	62½	14,971
Preferred	100	....	....	....	....	99	....	....	....	99½	....	99	....	300
Standard Oil.	100	646½	646	643	640	644	640	643	640	645	643	641	635	326
Tenn. C. I. & R.R.	100	70½	68½	74½	68½	75	72½	73½	72½	75⅞	72½	75½	74½	168,260
U. S. Steel Corp	100	27½	26½	27½	26	27	26½	27½	26½	28¼	27½	28¼	27½	671,085
Preferred	100	85½	84½	85½	84½	85½	84½	86	85½	87½	86	88½	87½	490,367
Va.-Car Chem.	100	38½	37½	39½	38½	44	39½	42½	42½	42½	41½	42½	42	32,816
Preferred	100	111	....	111½	111	114½	112	113	....	113½	....	113	....	4,000

*Pittsburg Exchange; †Philadelphia Exchange; all others, New York Stock Exchange.

Total sales, 1,779,414 shares.

STOCK QUOTATIONS.

SAN FRANCISCO.*

Company.	Location.	Nov. 3 H.	Nov. 3 L.	Nov. 4 H.	Nov. 4 L.	Nov. 5 H.	Nov. 5 L.	Nov. 7 H.	Nov. 7 L.	Nov. 8† H.	Nov. 8† L.	Nov. 9 H.	Nov. 9 L.	Sales.
MacNamara	Nev.	.29	.26	.27	.25	.27	.26	.27	.26	.....	.....	.22	.21	38,350
Mont. Tonopah	Nev.	192½	1.90	192½	.....	.....	1.95	192½	.....	.....	1.90	.....	.....	2,950
Ton. Belmont	Nev.	.76	.73	.79	.78	.85	.80	.85	.81	.....	.....	.77	.76	7,100
Ton. Midway	Nev.	.38	.37	.41	.38	.41	.40	.40	.39	.....	.....	.39	.....	10,450
Ton. Mg. Co	Nev.	912½	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	300
Ton. North Star	Nev.	.18	.....	.....	.....	.....	.....	.17	.....	.....	.....	.....	.....	1,500

*San Francisco & Tonopah Exchange. Total sales, 60,650 shares. †Holiday.

SAN FRANCISCO (By Telegraph).

Company.	November. 14	November. 15	Company.	November. 14	November. 15
Belcher	$0.14	$0.16	Gould & Curry	$0.10	$0.10
Best & Belcher	1.00	1.05	Hale & Norcross	.63	.63
Caledonia	.35	.35	Mexican	1.05	1.10
Challenge Con.	.13	.13	Ophir	2.10	2.15
Chollar	.12	.13	Overman	.12	.12
Confidence	.80	.83	Sierra Nevada	.34	.35
Con. California & Virginia	1.60	1 70	Union Con	.47	.50
Crown Point	.16	.15	Yellow Jacket	.16	.15

COLORADO SPRINGS (By Telegraph).

Company.	Nov. 14 H.	Nov. 14 L.	Nov. 15 H.	Nov. 15 L.	Company.	Nov. 14 H.	Nov. 14 L.	Nov. 15 H.	Nov. 15 L.
Anaconda	.11	.10	.....	.....	Jack Pot	.....	.....	.....	.....
C. K. & N.	.22	.20½	.22	.20	Last Dollar	.25	.....	.....	.....
Cripple Ck. Con.	.10	.09½	.10½	.10½	Mollie Gibson	.04½	.03½	.04½	.03½
Doctor Jack Pot	.05	.04½	.04½	.04½	Moon Anchor	.07	.05	.07	.05
Elkton Con	.65	.64½	.65½	.65½	Old Gold	.09½	.08½	.....	.....
El Paso	1.17½	1.16	1.14	1.13	Pharmacist	.03½	.03½	.04	.03½
Gold Dollar	.05½	.05½	.05½	.05½	Portland	1.71	1.65	1.71	1.65
Gold Sovereign	.06	.05½	.06½	.06	Vindicator Con	.69	.....	.68	.66
Isabella	.20½	.19½	.20	.19½	Work	.07½	.07½	.08	.07½

ST. LOUIS, MO.* Nov. 12.

Company.	Par Val.	Bid.	Ask.	Company.	Par Val.	Bid	Ask.
Am. Nettie, Colo	$10	$0.20	$0.25	Columbia Lead, Mo.	$10	$0.25	$1.00
Center Creek	10	1.00	1.50	Con. Coal, Ill	100	12.00	17.50
Central Coal & C.	100	60.00	62.50	Doe Run Lead, Mo.	100	110.00	115.00
Central C. & C., Pf	100	70.00	72.00	Granite Bimet., Mont.	10	.26	.31
Central Lead, Mo.	100	110.00	115.00	St. Joe Lead, Mo	10	14.50	16.00

*By our Special Correspondent.

DULUTH, MINN. Nov. 7.

Company.	Par Val.	Bid.	Ask.	Company.	Par Val.	Bid.	Ask.
Black Mountain	$1	$1.25	$1.35	Lake Sup. & Pitts	$10	$50.50	$51.00
Calumet & Arizona	10	102.00	105.00	Pitts. & Duluth	15	78.50	80.00
Calumet & Bisbee	10	.....	2.00	Shakespeare	1	.....	.20
Calumet & Pittsburg	10	41.00	42.00	United Mexican	10	.....	.25
Junction Development	15	68.00	70.00	Wolverine & Arizona	10	.....	1.50

MONTREAL.* Nov. 11.

Company.	Par Val.	High	Low	Sales	Company.	Par Val.	High	Low	Sales
Dominion Coal	100	63.00	59 25	1,436	Montreal Steel	100	.....	.....	.....
Dom. Coal, Pf	100	115.00	112.00	62	Mont'l Steel, Pf	100	.....	.....	.....
Dom. I. & St	100	18.00	16.00	3,943	Nova Scotia St	100	69.50	63.00	4,704
Dom. I. & St., Pf.	100	49.00	44.00	890	N. S. Steel, Pf	100	105.00	.....	4

*Montreal Stock Exchange. Total sales, 11,039 shares.

MEXICO. Nov. 4

Company.	Shares Issued	Prices, Mex. Bid.	Prices, Mex. Ask.	Company.	Shares Issued	Prices, Mex. Bid.	Prices, Mex. Ask.
DURANGO:				Soledad, aviada	$670	$1,400	$1,480
Ca. Min. de Penoles	2,500	$2,600	$3,000	Sorpresa, aviada	960	330	350
San Andres de la Sierra	200	10,000	.....	MEXICO:			
GUANAJUATO:				Aldebarren	2,000	65	72
Cinco Senores y An. aviadoras	2,000	32	36	Buen Despacho	3,000	75	83
Cinco, Senores y An. aviada	400	32	36	Dos Estrellas	3,000	3,020	3,100
Providencia, San Juan de la Luz	6,000	165	175	La Esperanza (El Oro)	3,000	1,500	1,500
GUERRERO:				Santa Ana, Esperanza	2,400	15	30
Garduno y Anexas	7,200	30	35	NUEVO LEON:			
HIDALGO:				La Fraternal	1,000	580	620
Amistad y Con.	9,600	72	74	Norias de Bajan	1,000	500	600
Carmen, aviada	1,100	205	240	SAN LUIS POTOSI:			
Guadalupe Fresnillo Mill	1,000	170	200	Concepcion y An	3,000	50	70
GuadalupeFresnillo Mine	1,400	70	80	El Barreno, aviadora	2,000	79	85
Maravillas y An., aviador	1,680	90	110	Sta. Maria de la Paz	9,600	223	226
Maravillas el Lobo	1,000	130	180	ZACATECAS:			
Refugio, aviada	12,800	680	740	Asturiana y An	2,500	10	15
Sta. Gertrudis y An. aviadas	9,600	10	12	Candelaria y Pinos	2,500	35	45
Sta. Gertrudis y An. aviadora	28,800	75	76	San Carlos y Anexas	2,500	36	42
San Rafael y An., Trompillo	1,200	2,400	2,525	Sta. Maria de Gaud	2,500	85	90
San Rafael y An., aviada	1,200	825	900	MISCELLANEOUS:			
				Bartolome de Medina	2,000	99	102
				Naica (Chihuahua)	100	11,000	13,000
				Natividad (Oxaca) aviadora	1,800	95	100
				San Francisco Hac.	6,000	91	94
				Union Hacienda	3,000	380	390

LONDON. Nov. 4

Company.	Shares Issued.	Par value. £	s.	d.	Latest dividend. Amt. s.	d.	Date.	Quotations. Buyers. £	s.	d.	Sellers. £	s.	d.
American:													
*Alaska-Treadwell	200,000	5	0	0	4	0	Oct., 1904	4	15	0	5	0	0
Anaconda	1,200,000	5	0	0	2	0	Nov., 1904	5	7	6	5	10	0
Camp Bird	820,000	1	0	0		9	Nov., 1904	1	8	6	1	9	0
Copiapo	112,500	2	0	0	5	0	Oct., 1904		17	6	1	2	6
De Lamar	80,000	1	0	0	2	0	Oct., 1904		16	3		18	9
El Oro	1,080,000	1	0	0		9	July, 1904	1	1	3	1	3	9
Frontino & Bolivia	128,662	1	0	0	3	0	July, 1901		8	6		9	6
Le Roi	200,000	5	0	0	5	0	Nov., 1899		15	0		17	6
Le Roi No. 2	120,000	5	0	0	1	0	June, 1904		12	6		15	0
Mesquital	250,000	1	0	0		3	Feb., 1903		2	9		3	3
Palmarejo & Mexican	445,000	1	0	0	rts.		Apr., 1903		7	9		8	3
Standard	500,000		4	0		2½	Sept., 1903		1	0		2	0
Stratton's Independence	1,000,007	1	0	0		6	Dec., 1903		5	0		5	6
St. John del Rey	546,265	1	0	0		6	Dec., 1903		13	0		14	0
Tomboy	300,000	1	0	0	1	0	June, 1902	1	0	0	1	5	0
Ymir	200,000	1	0	0	1	0	Mar., 1902		2	6		5	0
European:													
Linares	15,000	3	0	0	5	0	Sept., 1904	3	15	0	4	5	0
Mason & Barry	185,172	1	0	0	7	0	May, 1904	3	2	6	3	7	6
*Rio Tinto	325,000	5	0	0	32	6	Nov., 1904	59	2	6	59	7	6
Rio Tinto, preferred	325,000	5	0	0	2	6	Nov., 1904	6	2	6	6	7	6
Tharsis	625,000	2	0	0	7	0	May, 1904	4	17	6	5	2	6
West Australian:													
Associated	495,388	1	0	0	2	6	July, 1904	2	2	6	2	5	0
Cosmopolitan	400,000	1	0	0	1	0	Apr., 1904		7	0		7	6
Golden Horseshoe	300,000	5	0	0	6	0	Nov., 1904	7	10	0	7	12	6
Great Boulder	1,750,000		2	0		9	Sept., 1904	1	0	9	1	1	3
Gt. Boulder Persever'ce	1,400,007	1	0	0	1	0	Sept., 1904		12	9		13	0
Great Fingall	250,000	1	0	0	7	0	Oct., 1904	8	5	0	8	12	6
Ivanhoe	200,000	5	0	0	5	0	Oct., 1904	7	17	6	8	0	0
Kalgurli	120,000	1	0	0	2	6	Oct., 1904	5	16	3	5	18	9
*Lake View	250,000	1	0	0	1	6	Oct., 1904	1	3	0	1	4	1
Oroya-Brownhill	450,000	1	0	0	3	0	Sept., 1904	3	8	9	3	9	11
Miscellaneous:													
*Brilliant Central	100,000	1	0	0	1	0	Nov., 1904	1	15	0	2	0	0
Briseis	600,000	1	0	0	.....		.....		11	6		12	6
Broken Hill	960,000		8	0	1	0	Nov., 1904	2	4	6	2	5	6
Mt. Lyell	275,000	3	0	0	1	3	June, 1904		11	0		12	0
Mt. Morgan	1,000,000	1	0	0		3	Nov., 1904	2	7	6	2	10	0
Waihi	497,412	1	0	0	2	6	Sept., 1904	5	16	3	5	18	9
Indian:													
Champion Reef	513,832		10	0	1	4	Sept., 1904	1	12	6	1	13	9
Mysore	566,043		10	0	4	6	Nov., 1904	6	13	9	6	16	3
Nundydroog	484,000		10	0	1	6	Nov., 1904	1	16	0	1	17	0
Ooregum	343,000		10	0	1	3	Aug., 1904		18	6		19	6
Ooregum, pfd	240,000		10	0		4	Aug., 1904	1	7	6	1	8	9
South African:													
Angelo	600,000	1	0	0	7	0	Aug., 1904	6	17	6	7	0	0
Bonanza	200,000	1	0	0	8	0	Aug., 1904	1	3	9	1	6	3
†British South Africa	4,436,019	1	0	0	rts.		May, 1899	1	7	7	1	8	9
Cape Copper	300,000	2	0	0	2	6	July, 1904	4	6	3	4	8	9
Cape Copper, pfd	75,000	2	0	0	2	6	July, 1904	4	2	6	4	7	6
City & Suburban	340,000	4	0	0	4	0	Aug., 1904	5	8	9	5	11	3
Consol. Gold-Fields	2,000,000	1	0	0	2	6	Nov., 1904	7	2	6	7	3	9
Crown Reef	120,000	1	0	0	9	0	Oct., 1904	16	0	0	16	10	0
De Beers, preferred	800,000	2	10	0	10	0	Aug., 1904	18	5	0	18	7	6
De Beers, deferred	1,000,000	2	10	0	12	6	Aug., 1904	18	2	6	18	10	0
East Rand	990,000	1	0	0	5	0	July, 1903	8	10	0	8	11	3
Ferreira	90,000	1	0	0	22	6	Aug., 1904	21	0	0	21	10	0
Geldenhuis	200,000	1	0	0	7	0	Aug., 1904	5	11	3	5	13	9
Geduld	400,000	1	0	0	rts.		Mar., 1902	6	18	9	7	1	3
Henry Nourse	125,000	1	0	0	8	0	Aug., 1904	8	2	6	8	7	6
Jubilee	50,000	1	0	0	5	0	Aug., 1904	4	5	0	4	10	0
Jumpers	100,000	1	0	0	2	6	May, 1904	2	10	0	2	15	0
Langlaagte	470,000	1	0	0	2	0	Aug., 1904	3	18	9	4	1	3
May	288,750	1	0	0	3	0	Aug., 1904	3	18	9	4	0	0
Meyer & Charlton	100,000	1	0	0	5	0	Aug., 1904	5	7	6	5	12	6
Modderfontein	290,000	1	0	0	rts.		Apr., 1902	10	2	6	10	5	0
Namaqua	94,331	2	0	0	3	0	Dec., 1903	3	2	6	3	7	6
New Jagersfontein	200,000	5	0	0	15	0	Dec., 1904	26	15	0	27	5	0
New Primrose	325,000	1	0	0	3	0	Aug., 1904	3	10	0	3	12	6
Rand	1,795,956		5	0	5	0	Aug., 1902	10	17	6	10	18	9
Robinson	750,000	5	0	0	6	0	Aug., 1904	9	15	0	10	0	0
Robinson Deep	950,000	1	0	0	3	0	Aug., 1904	5	7	6	5	10	0
Rose Deep	425,000	1	0	0	3	0	Aug., 1904	8	10	0	8	15	0
Salisbury	100,000	1	0	0	2	0	Sept., 1904	1	15	0	2	0	0
Village Main Reef	400,000	1	0	0	4	0	July, 1904	7	5	0	7	7	6
Wemmer	80,000	1	0	0	12	6	July, 1904	10	10	0	11	0	0

*Ex-dividend. †Ex-rights.

LONDON (By Cable).*

Company.	Nov. 9 £	s.	d.	Nov. 16 £	s.	d.	Company.	Nov. 9 £	s.	d.	Nov. 16 £	s.	d.
Camp Bird	1	9	0	1	9	4½	Esperanza		19	6		19	6
Con. Gold Fields	7	8	9	7	7	6	Modderfontein	10	0	0	9	12	6
De Beers	18	10	0	18	10	0	Rand Mines	11	2	6	11	2	6
Dolores	1	5	3	1	5	0	Rio Tinto	61	5	0	62	12	6
East Rand	8	12	6	8	16	0	Simmer & Jack	1	18	9	1	18	9
El Oro	1	2	6	1	3	1½	Tomboy	1	11	3	1	7	6

*Furnished by Wm. P. Bonbright & Co., 15 Wall St., New York.

PARIS.

Company.	Location.	Capital Stock. Francs.	Par value. Fr.	Latest dividend. Fr.	Prices. Opening. Fr.	Prices. Closing. Fr.
Anzin, Coal	France	.....	.....	290.00	5,725.00	5,710.00
Boleo, c	Lower Cal.	12,000,000	500	104.17	2,245.00	2,260.00
Champ d'Or, g	S. Africa	3,375,000	25	3.75	16.75	16.75
Courrieres, Coal	France	600,000	500	110.00	2,910.00	2,949.00
Fraser River, g	Brit. Col	250,000	25	.....	5.50	5.50
Huanchaca, s	Bolivia	40,000,000	125	2.50	92.75	93.75
Laurium, z. l	Greece	16,300,000	500	25.00	309.00	309.00
Malfidano, z	Italy	12,500,000	500	50.00	625.00	630.00
Metaux, Cie. Fran. de	France	25,000,000	500	22.50	510.00	505.00
Mokta-el-Hadid, i. l	Algeria	18,312,000	500	40.00	1,022.00	1,010.00
Nickel, n	N. Caledonia	15,000,000	250	22.50	639.00	610.00
Penarroya, Coal	Spain	.....	500	45.00	1,130.00	1,136.50
Vielle Montagne, z	Belgium	9,000,000	30	30.00	778.00	778.00

c—Copper. g—Gold. i—Iron. l—Lead. n—Nickel. s—Silver. z—Zinc.

CHEMICALS, MINERALS, RARE EARTHS, ETC.—CURRENT WHOLESALE PRICES.

(See also Market Reviews.)

ABRASIVES—		
Bort as to size	carat,	$10.00@$18.00
Carborundum, f.o.b. Niagara Falls, Powd	lb.	.08
Grains	"	.10
Corundum, N. C.	"	.07@.10
Chester, Mass	"	.04½@.05
Craigmont, Ont.	"	.05½@.06½
Mont. f.o.b. Chicago	"	.07@.07½
Crushed Steel, f.o.b. Pittsburg	"	.05½
Emery, in kegs: Turkish flour	"	.03½
Grains	"	.05@.05½
Naxos flour	"	.03½
Grains	"	.05@.05½
Chester flour	"	.03½
Grains	"	.05@.05½
Peekskill, f.o.b. Easton, Pa., flour	"	.01½
Grains, in kegs	"	.02½
Crude, ex-ship N. Y.: Abbott (Turkey)	lg. ton	26.50@30.00
Kuluk (Turkey)	"	22.00@24.00
Naxos(Greek)h.gr	"	26.00
Garnet, per quality	sh. ton	25.00@35.00
Pumice Stone, Am. Powd	lb.	.01½@.02
Italian, powdered	"	.01½
Lump, per quality	"	.04@.05
Rottenstone, ground	"	.02½@.04½
Lump, per quality	"	.06@.20
Rouge, per quality	"	.10@.30
Steel Emery, f.o.b. Pittsburg	"	.07
ACIDS—		
Boracic, crystals	"	.10
Powdered	"	.10½
Carbonic, liquid gas	"	.12½
Chromic, crude	"	.19
Hydrofluoric, 30%	"	.03
48%	"	.05
60%	"	.11
Sulphurous, liquid anhy. f.o.b. Bound Brook, N. J.	"	.06
ALCOHOL—Grain	gal.	2.40@2.42
Refined wood, 95@97%	"	.60@.65
Purified	"	1.25@1.30
ALUM—Lump	100 lb.	1.75
Ground	"	1.85
Porous	"	.90
Powdered	"	3.00
Chrome, com'l	"	2.75@3.00
ALUMINUM—		
Nitrate	lb.	1.50
Oxide, com'l, common	"	.06½
Best	"	.20
Pure	"	.80
Hydrated	100 lb.	2.60
Sulphate, com'l	"	1.25@1.50
AMMONIA—		
Aqua 16°	lb.	.03½
18°	"	.03½
20°	"	.03½
26°	"	.04½
AMMONIUM—		
Carbonate, lump	"	.07½
Powdered	"	.08½
Muriate grain	"	.05½@.05½
Lump	"	.09½
Nitrate, white pure (99%)	"	.12
Phosphate, com'l	"	.09
Pure	"	.12
ANTIMONY—Glass	"	.30@.40
Needle, lump	"	.05½@.06
Powdered, ordinary	"	.05½@.07½
Oxide, com'l white, 95%	"	.09½
Com'l gray	"	.07
Sulphuret, com'l	"	.16
ARSENIC—White	"	.02½@.03½
Red	"	.06½@.06½
ASPHALTUM—		
Barbadoes	"	.02½@.03
Cuban	"	.01½@.03½
Egyptian, crude	"	.06@.07
Gilsonite, Utah, ordin'y.	"	.03
Select	"	.03½
San Valentino (Italian)	lg. ton	16.00
Seyssel (French), mastic	"	21.00
Trinidad, refined	"	35.00
Ventura, Cal	"	32.00
BARIUM—		
Carb. Lump, 80@90%	sh. ton	25.00@27.00
92@98%	"	26.00@29.00
Powdered, 80@90%	lb.	.01½@.02
Chloride, com'l	100 lb.	1.50@1.70
Chem. pure cryst	lb.	.05
Nitrate, powdered	"	.05½
Sulphate (Blanc Fixe)	"	.02
BARYTES—		
Am. Crude, No. 1	sh. ton	9.75
Crude, No. 2	"	8.00
Crude, No. 3	"	7.00
Snow-white	"	15.00@15.50
Floated	"	15.75@16.00
Foreign gray	"	13.50
Snow-white	"	17.25
Floated	"	18.75
BAUXITE—Ga. or Ala. Mines:		
First grade	lg. ton	5.25@5.50
Second grade	"	4.50@4.75
BISMUTH—Subnitrate	lb.	2.00
Subcarbonate	"	2.25
BITUMEN—"B"	"	.03½
"A"	"	.05
BONE ASH	"	.02½@.02½
BORAX	"	.07½@.07½
BROMINE—Bulk	"	.48
CADMIUM—Metallic	"	1.40
Sulphate	100 lb.	2.00@2.50
CALCIUM—Acetate, gray	"	1.87½
Acetate, brown	"	1.30
Carbide, ton lots f.o.b. Niagara Falls, N. Y., for Jersey City, N. J.	sh. ton	65.00
Carbonate, ppt	lb.	.05
Chloride	100 lb.	.70@.90
CEMENT—		
Portland, Am., 400 lb.	bbl.	.90@1.25
Foreign	"	1.25@1.75
"Rosendale," 300 lb.	"	.80
Slag cement	"	.75@1.25
CERESINE—		
Orange and Yellow	lb.	.13½
White	"	.15
CHALK—Lump, bulk	sh. ton	3.00
Ppt. per quality	lb.	.04½@.04½
CHLORINE—Liquid	"	.30
Water	"	.10
CHROME ORE—(50%) ex-ship N. Y.	lg. ton	19.00@19.50
Bricks, f.o.b. Pittsburg	M	175.00
CLAY, CHINA—Am. com., ex-dock, N. Y.	lg. ton	7.75@8.00
Am. best, ex-dock, N. Y.	"	9.00@9.25
English, common	"	11.00@11.25
Best grade	"	16.75
Fire Clay, ordinary	sh. ton	4.25
Best	"	6.00
Slip Clay	"	5.00
COAL TAR PITCH	gal.	.08
COBALT—Carbonate	lb.	1.75
Nitrate	"	1.50
Oxide—Black	"	2.50
Smalt, blue ordinary	"	.06
Best	"	.20
COPPERAS—Bulk	100 lb.	.47½
In bbls	"	.52½
COPPER—Carbonate	lb.	.18@.19
Chloride	"	.25
Nitrate, crystals	"	.35
Oxide, com'l	"	.19
CRYOLITE	"	.06½
EXPLOSIVES—		
Blasting powder, A	25-lb. keg	.65
Blasting powder, B	"	1.40
"Rackarock," A	lb.	1.40
"Rackarock," B	"	.18
Judson R.R. powder	"	.10
Dynamite (20% nitroglycerine)	"	.13
(30% nitro-glycerine)	"	.14
(40% nitro-glycerine)	"	.15
(50% nitro-glycerine)	"	.16½
(60% nitro-glycerine)	"	.18
(75% nitro-glycerine)	"	.21
Glycerine for nitro	"	.11½@.11½
FELDSPAR—Ground	sh. ton	9.75@10.00
FLINT PEBBLES—		
Danish, Best	lg. ton	14.75
French, Best	"	11.75
FLUORSPAR—		
Lump	sh. ton	8.00@10.00
Ground	"	11.50@13.50
FULLER'S EARTH—Lump	100 lb.	.80
Powdered	"	.85
GRAPHITE—Am. f. o. b. Providence, R. I., lump	sh. ton	8.00
Pulverized	"	30.00
Am. pulv., other than R. I., f. o. b., New York	"	45.00
Best flake	"	150.00
Ceylon, common pulv	lb.	.02½@.03½
Best, pulverized	"	.04@.08
German, com. pulv.	"	.01½@.01½
Best pulverized	"	.01½@.02
Italian, pulverized	"	.01½
GYPSUM—Ground	sh. ton	8.00@8.50
Fertilizer	"	7.00
Rock	lg. ton	4.00
English and French	"	14.00@16.00
INFUSORIAL EARTH—		
Ground Am. best	"	20.00
French	"	37.50
German	"	40.00
IODINE—Crude	100 lb.	2.45
IRON—Muriate	lb.	.05
Nitrate, com'l	"	.01½
True	"	.04
Oxide, pure copperas color	"	.05@.10
Purple-brown	"	.02
Venetian red	"	.01@.01½
Scale	"	.01@.03
KAOLIN—(See China Clay.)		
LEAD—Acetate, white	lb.	.08½@.08½
Brown	"	.06½@.06½
Nitrate, com'l	"	.06½
" granular	"	.08½
LIME—Com., abt. 250 lb.	bbl.	.80
Finishing	"	1.00
MAGNESITE—Greece. Crude (95%)	lg. ton	6.50@7.00
Calcined	sh. ton	16.50@17.00
Bricks, best imp., f.o.b. N. Y.	M.	155.00
Bricks, domes., per qual., f.o.b. Pittsburg	"	160@200
MAGNESIUM—		
Carbonate, light, fine pd.	lb.	.05
Blocks	"	.07@.09
Chloride, com'l	"	.01½
Fused	"	.20
Nitrate	"	.60
Sulphate	100 lb.	.55@.95
MANGANESE— Crude powd. 70@75% binoxide	lb.	.01½@.01½
75@85% binoxide	"	.01½@.02½
85@90% binoxide	"	.02½@.03½
90@95% binoxide	"	.03½@.05½
Carbonate	"	.16@.20
Chloride	"	.04
Ore	unit	.18@.20
MARBLE—Flour	sh. ton	6.00@7.00
MERCURY—Bichloride	lb.	.68
MICA—N.Y.gr'nd, coarse	sh. ton	33.00@38.00
Fine	lb.	.00½@.02
Sheets are sold as to size and quality.		
MINERAL WOOL— Slag, ordinary	sh. ton	19.00
Selected	"	25.00
Rock, ordinary	"	32.00
Selected	"	40.00
NICKEL—Oxide, No. 1	lb.	1.00
No. 2	"	.60
Sulphate	"	.20@.21
OILS—Black, reduced 29 gr. 25@30, cold test	gal.	.11@.12
15, cold test	"	.12@.13
Zero	"	.16½@.17½
Summer	"	.11@.12
Cylinder, dark steam ref.	"	.12½@.14
Dark, filtered	"	.16½@.17½
Light, filtered	"	.18½@.19½
Extra cold test	"	.23@.30
Gasoline, 86@90	"	.17@.22
Naphtha, crude, 68°@72°	bbl.	12.40
"Stove"	gal.	.15
Linseed, domestic raw	"	.37@.41
Boiled	"	.43
Calcutta, raw	"	.55
OZOKERITE	lb.	.11½
PAINTS AND COLORS— Chrome green, common	"	.03
Pure	"	.16
Yellow, common	"	.10½
Best	"	.14
Lampblack, com'l	"	.04½
Refined	"	.07
Litharge, Am. pow'd	"	.05½@.06
English glassmakers'	"	.08½@.08½
Lithophone	"	.02½@.06½
Metallic, brown	sh. ton	19.00
Red	"	16.00
Ocher, Am. common	"	8.50@9.00
Best	"	16.00
Dutch, washed	lb.	.02½
French, washed	"	.01½@.01½
Orange mineral, Am.	"	.07½@.08
Foreign, as to make	"	.07@.10½
Paris green, pure, bulk	"	.11
Red lead, American	lb.	.06½@.06½
Foreign	"	.07@.08½
Turpentine, spirits	gal.	.53½
White lead, Am., dry	lb.	.05@.05½
American, in oil	"	.06@.06½
Foreign, in oil	"	.09@.09½
Zinc, white, Am., extra dry	"	.04½@.04½
Foreign, red seal, dry	"	.06@.08½
Green seal, dry	"	.06½@.09½
POTASSIUM— Bicarbonate cryst.	lb.	.08½
Powdered or gran.	"	.14
Bichromate, Am.	"	.08½@.08½
Scotch	"	.08½@.08½
Bromide	"	.30
Carbonate (80@85%)	"	3.50@4.00
Caustic, ordinary	"	.04½
Elect. (90%)	"	.06½
Chlorate, powdered	"	.08½
Crystals	"	.08½
Chromate	"	.35
Cyanide (98@99%)	"	.19@.20
Kainit	lg. ton	9.30
Manure salt, 20%	100 lb.	.66
Double Manure Salt, 48@53%	"	1.12
Muriate, 80@85%	"	1.83
95%	"	1.86
Permanganate	lb.	.09½@.09½
Prussiate, yellow	"	.13½@.14
Red	"	.35½@.36
Sulphate, 90%	100 lb.	2.11
96%	"	2.14
Sylvinit	unit	.41
QUARTZ—(See Silica.)		
SALT—N. Y. com. fine 280 lb.	bbl.	.72@1.18
N. Y. agricultural	sh. ton	4.40
SALTPETER—Crude	100 lb.	3.55
Refined	"	4.00@4.50
SILICA— Ground quartz, ord'ry	sh. ton	9.00@10.00
Best	"	12.00@13.00
Lump quartz	"	2.50@4.00
Glass sand	"	2.75
SILVER—Chloride	oz.	.65
Nitrate Crystals	"	.36
Oxide	"	.85@1.10
SODIUM— Bicarb., ord., bulk, f.o.b. works	100 lb.	1.30
Extra domes, f.o.b. works	"	3.50
Bichromate	lb.	.06½
Carbonated ash, high test, in bags, f.o.b. works	100 lb.	.75@.77½
Foreign, f.o.b. N. Y.	"	.85@.87½
Caustic, 70@76%, f.o.b. works	"	1.77½@1.85
Foreign, f.o.b. N. Y.	"	1.90@1.95
Chlorate, com'l	"	.07½
Hyposulphite, Am	"	1.60@1.65
German	"	1.70@1.90
Peroxide	lb.	.45
Phosphate	"	.02½@.02½
Prussiate	"	.09½
Sal soda, f.o.b. works	100 lb.	.60
Foreign, f.o.b. N. Y.	"	.67½
Silicate, concentrated	lb.	.05
Com'l	"	.01
Sulphate, com'l	100 lb.	.65
Sulphide, crystals, bbl.	lb.	.01½
Sulphite crystals	"	.02½
SULPHUR—Roll	100 lb.	1.85
Flour	"	1.90
Flowers, sublimed	"	2.20
TALC—N. C., 1st grade	sh. ton	20.00
N. Y., Fibrous, best	"	10.25
French, best	lg. ton	25.00
Italian, best	"	30.00
TAR—Regular	bbl.	2.25
Oil bbl. (50 gal.)	"	4.90
TIN—Crystals, bbl.	lb.	.18
Oxide	"	.35
URANIUM—Oxide	"	2.25@3.00
ZINC—Metallic, ch. pure	"	.07@.09½
Carbonate, ppt	"	.09
Chloride solution, com'l	"	.02½
Chloride granular	"	.04½@.04½
Dust	"	.05½@.05½
Sulphate	"	.02@.02½

The Rare Earths.

BORON—Nitrate	lb.	$1.50
CALCIUM—Tungstate (Scheelite)	"	.60
CERIUM—Nitrate	"	10.00
DIDYMIUM—Nitrate	"	35.00
ERBIUM—Nitrate	"	40.00
GLUCINUM—Nitrate	"	20.00
LANTHANUM—Nitrate	"	30.00
LITHIUM—Carbonate	"	1.50
LITHIUM—Nitrate	oz.	.60
STRONTIUM—Nitrate	lb.	.07@.07½
THORIUM—Nit. 49@50%	"	4.50
URANIUM—Nitrate	oz.	.25
ZIRCONIUM—Nitrate	lb.	8.00

NOTE.—These quotations are for wholesale lots in New York unless otherwise specified, and are generally subject to the usual trade discounts. Readers of THE ENGINEERING AND MINING JOURNAL are requested to report any corrections needed, or to suggest additions which they may consider advisable.